

Supplementary Data.

Table S1. Details of QTL that control seed α -tocopherol (α -Toc), γ -tocopherol (γ -Toc), δ -tocopherol (δ -Toc), total tocopherol (T-Toc) contents and (α/γ)-Toc ratio in maize from 2002 to 2022. Candidate genes identified with these QTL regions are also shown.

Figure S1. Chromosome locations of QTL that control seed α -tocopherol (α -Toc), γ -tocopherol (γ -Toc), δ -tocopherol (δ -Toc), total tocopherol (T-Toc) contents and (α/γ)-Toc ratio in maize from 2002 to 2022.

Table S1. Details of QTL that control seed α -tocopherol (α -Toc), γ -tocopherol (γ -Toc), δ -tocopherol (δ -Toc), total tocopherol (T-Toc) contents and (α/γ)-Toc ratio in maize from 2002 to 2022. Candidate genes identified with these QTL regions are also shown.

Trait	QTL	Chr.	Marker / Interval	Position (cM)	LOD/P	R ² (%)	Candid. Gene/Product	Environment	Reference
α -Toc & γ -Toc	<i>qa-Toc-1 qγ-Toc-1</i>	1	p-umc1073-p-phi109275	81.9-118.4	*	*	*	IL, USA	(Rochefford et al., 2002)
	<i>qa-Toc-2 qγ-Toc-2</i>		p-umc2237-p-umc1245	216.3-258.2	*	*	*	IL, USA	
	<i>qa-Toc-3 qγ-Toc-3</i>	4	p-umc1808-p-umc2188	162.1-181.7	*	*	*	IL, USA	
	<i>qa-Toc-4 qγ-Toc-4</i>	5	p-umc0081-p-umc2304	133.8-141.3	*	*	*	IL, USA	
	<i>qa-Toc-5 qγ-Toc-5</i>		p-umc1019-p-phi085	162.8-193.9	*	*	*	IL, USA	
	<i>qa-Toc-6 qγ-Toc-6</i>		p-phi085-p-phi048	193.9-194.4	*	*	*	IL, USA	
	<i>qa-Toc-7 qγ-Toc-7</i>	6	p-umc1006-p-bnlg2191	24.4-27.2	*	*	*	IL, USA	
	<i>qa-Toc-8 qγ-Toc-8</i>	7	p-umc1713-p-umc1301	107.8-144.5	*	*	*	IL, USA	
QTL Identified in (W64a X A632) RIL population (n=200)									(Wong et al., 2003)
α -Toc	<i>qa-Toc-1</i>	5	mmc0081-umc1155	51.0-53.0	4.2	2.9	*	IL, USA	
	<i>qa-Toc-2</i>		umc1155-phi085	89.0-91.0	13.9	19.6	*	IL, USA	
	<i>qa-Toc-3</i>	6	umc21-bmc1154	93.0-95.0	3.6	2.5	*	IL, USA	
	<i>qa-Toc-4</i>	8	phi115-bmc1176	63.0-65.0	3.1	2.7	*	IL, USA	
δ -Toc	<i>qδ-Toc-1</i>	1	bmc1016-dupssr026	145.0-147.0	3.9	2.8	*	IL, USA	
	<i>qδ-Toc-2</i>	5	mmc0081-umc1155	55.0-57.0	5.3	9.0	*	IL, USA	
	<i>qδ-Toc-3</i>	8	umc1149-mmc0181	97.0-99.0	3.1	5.3	*	IL, USA	
γ -Toc	<i>qγ-Toc-1</i>	1	bmc1016-dupssr026	141.0-143.0	3.2	5.4	*	IL, USA	
	<i>qγ-Toc-2</i>	2	dupssr21-umc1156	59.0-61.0	3.2	3.2	*	IL, USA	
	<i>qγ-Toc-3</i>	5	phi113-dupssr010	19.0-21.0	8.7	23.6	*	IL, USA	
	<i>qγ-Toc-4</i>	7	bmc1305-dupssr009	111.0-113	4.4	7.7	*	IL, USA	
Total-Toc	<i>qT-Toc-1</i>	5	phi113-dupssr010	15.0-17.0	7.4	10.9	*	IL, USA	
(α/γ)-Toc Ratio	<i>q(α/γ)-Toc-1</i>	5	umc1155-phi085	91.0-93.0	9.4	33.0	*	IL, USA	
QTL Identified in (W64a X A632) X AE335 Testcross population (n=185)									
α -Toc	<i>qa-Toc-1</i>	3	phi046-bnlg197	221.0-223.0	4.3	3.5	*	IL, USA	
	<i>qa-Toc-2</i>	5	mmc0081-umc1155	51.0-53.0	7.7	2.3	*	IL, USA	
	<i>qa-Toc-3</i>		umc1155-phi085	79.0-81.0	6.4	0.4	*	IL, USA	
	<i>qa-Toc-4</i>		phi085-bmc1346	101.0-103.0	12.3	4.7	*	IL, USA	
	<i>qa-Toc-5</i>	6	dupssr015-bmc1136	191.0-193.0	4.0	4.2	*	IL, USA	
δ -Toc	<i>qδ-Toc-1</i>	5	umc1155-phi085	65.0-67.0	3.5	8.8	*	IL, USA	
	γ -Toc								
γ -Toc	<i>qγ-Toc-1</i>	5	dupssr010-umc1221	35.0-37.0	5.3	4.0	*	IL, USA	
	<i>qγ-Toc-2</i>		umc1155-phi085	83.0-85.0	3.9	7.5	*	IL, USA	
	<i>qγ-Toc-3</i>	7	bmc1305-dupssr009	111.0-113.0	6.6	11.1	*	IL, USA	
Total-Toc	<i>qT-Toc-1</i>	5	dupssr010-umc1221	37.0-39.0	3.7	6.4	*	IL, USA	
	<i>qT-Toc-2</i>	7	zdsRFLP-phi034	81.0-83.0	3.3	5.1	*	IL, USA	
	(α/γ)-Toc Ratio								
	<i>q(α/γ)-Toc-1</i>	5	mmc0081-umc1155	51.0-53.0	8.0	12.8	*	IL, USA	
	<i>q(α/γ)-Toc-2</i>		umc1155-phi085	91.0-93.0	16.8	30.5	*	IL, USA	
α -Toc	<i>qa-Toc-1</i>	1	umc1598-bnlg1811	79-94	8.3	15.5	*	China	(Chander et al., 2008)
	<i>qa-Toc-2</i>	1	umc1725-phi064	273-280	3.2	4.6	*	China	
	<i>qa-Toc-3</i>	2	P3VTE5-umc1265	3-19	3.1	5.3	<i>P3VTE5</i>	China	
	<i>qa-Toc-4</i>	5	bnlg1237-VTE4-phi085	130-140	7.9	13.8	<i>VTE4</i>	China	
	<i>qa-Toc-5</i>	8	umc1075-umc1304	17-33	6.1	7.9	*	China	
	<i>qa-Toc-6</i>	9	phi065-umc1258	33-44	6.3	9.6	*	China	
	<i>qa-Toc-7</i>	10	phi118-umc2053	0-5	4.3	5.4	*	China	
δ -Toc	<i>qδ-Toc-1</i>	6	umc1195-Y1ssr-umc1595	28-38	6.6	9.6	<i>PSY1</i>	China	
	<i>qδ-Toc-2</i>	7	mmc0171-VTE3	30-40	5.7	13.5	<i>VTE3</i>	China	
	<i>qδ-Toc-3</i>	7	bnlg1792-phi091	45-54	9.0	18.4	*	China	

γ -Toc	$q\delta$ -Toc-4	8	umc1075-umc1304	10-29	3.2	11.4	*	China
	$q\gamma$ -Toc-1	1	umc1403-phi001	57-68	5.3	9.5	*	China
	$q\gamma$ -Toc-2	1	phi001-bnlg1811	72-85	5.5	8.4	*	China
	$q\gamma$ -Toc-3	2	P3VTE5-umc1215	3-17	3.0	5.2	P3VTE5	China
	$q\gamma$ -Toc-4	5	umc2115-umc1447	58-72	7.0	16.4	*	China
	$q\gamma$ -Toc-5	5	umc1692-HPPD	76-84	4.6	7.1	HPPD	China
T-Toc	$q\gamma$ -Toc-6	5	bnlg1237-VTE4-phi085	131-141	4.2	5.6	VTE4	China
	$q\gamma$ -Toc-7	8	umc1075-umc1304	16-31	11.2	29.3	*	China
	qT -Toc-1	1	umc1403-phi001	59-69	7.0	13.7	*	China
	qT -Toc-2	1	phi001-umc1598	72-86	7.7	12.3	*	China
	qT -Toc-3	2	P3VTE5-umc1215	3-16	3.4	7.0	P3VTE5	China
	qT -Toc-4	5	umc2115-umc1447	59-73	5.6	11.7	*	China
(a/ γ)-Toc Ratio	qT -Toc-5	5	umc1692-HPPD	76-84	4.5	7.1	HPPD	China
	qT -Toc-6	8	umc1075-umc1304	12-30	14.1	33.5	*	China
	qT -Toc-7	9	umc1258-umc1688	39-45	3.0	3.6	*	China
	qT -Toc-8	9	umc1078-umc1471	54-63	3.9	6.9	*	China
	$q(a/\gamma)$ -Toc-1	3	phi053-dupssr23	101-111	3.0	3.3	*	China
	$q(a/\gamma)$ -Toc-2	5	umc2115-umc1447	59-74	6.8	9.0	*	China
α -Toc	$q(a/\gamma)$ -Toc-3	5	umc1692-HPPD	75-84	6.3	9.3	HPPD	China
	$q(a/\gamma)$ -Toc-4	5	bnlg1237-VTE4-phi085	134-138	10.2	13.3	VTE4	China
	$q(a/\gamma)$ -Toc-5	7	umc1112-umc2332	73-86	3.2	6.7	*	China
	qa -Toc-1	1	A/G-41,597	3,009,997	*	*	*	China (Li et al., 2012)
	qa -Toc-2	1	A/C-54,850	3,379,175	*	*	*	China
	qa -Toc-3	1	A/G-1,213	60,212,244	*	*	*	China
δ -Toc	qa -Toc-4	3	A/T-17,550	228,955,373	*	*	*	China
	qa -Toc-5	4	C/G-18,772	65,286,187	*	*	*	China
	qa -Toc-6	4	A/G-18,773	65,286,238	*	*	*	China
	qa -Toc-7	5	A/G-25,801	198,800,752	*	*	ZmVTE4	China
	qa -Toc-8	5	A/G-25,814	199,266,329	*	*	ZmVTE4	China
	qa -Toc-9	5	T/C-25,815	199,442,506	*	*	ZmVTE4	China
	qa -Toc-10	5	A/G-49,239	199,444,812	*	*	ZmVTE4	China
	qa -Toc-11	5	A/G-25,817	199,461,718	*	*	ZmVTE4	China
	qa -Toc-12	5	A/G-3,462	199,528,414	*	*	ZmVTE4	China
	qa -Toc-13	5	T/C-25,820	199,530,006	*	*	ZmVTE4	China
	qa -Toc-14	5	A/G-25,821	199,530,947	*	*	ZmVTE4	China
	qa -Toc-15	5	A/G-408	199,970,863	*	*	ZmVTE4	China
	qa -Toc-16	5	T/C-53,345	200,017,666	*	*	ZmVTE4	China
	qa -Toc-17	5	T/G-25,826	200,023,434	*	*	ZmVTE4	China
	qa -Toc-18	5	A/G-45,458	200,776,518	*	*	ZmVTE4	China
	qa -Toc-19	5	A/G-51,039	201,207,792	*	*	ZmVTE4	China
	qa -Toc-20	5	T/G-51,038	201,211,449	*	*	ZmVTE4	China
	qa -Toc-21	5	T/C-51,046	201,222,026	*	*	ZmVTE4	China
	qa -Toc-22	5	A/G-51,045	201,222,043	*	*	ZmVTE4	China
	qa -Toc-23	5	A/G-50,039	201,276,495	*	*	ZmVTE4	China
	qa -Toc-24	5	A/G-25,857	202,616,083	*	*	ZmVTE4	China
	$q\delta$ -Toc-1	2	A/G-10,638	86,253,631	*	*	*	China
	$q\delta$ -Toc-2	3	A/G-48,923	225,227,814	*	*	*	China
	$q\delta$ -Toc-3	4	A/G-18,695	61,876,947	*	*	*	China
	$q\delta$ -Toc-4	5	A/G-24,089	103,306,223	*	*	*	China
γ -Toc	$q\delta$ -Toc-5	9	A/G-2,725	94,285,743	*	*	*	China
	$q\gamma$ -Toc-1	1	T/C-7,874	227,897,687	*	*	*	China

T-Toc	<i>qγ-Toc-2</i>	3	T/G-51,195	213,191,036	*	*	*	China
	<i>qγ-Toc-3</i>	4	A/G-18,241	34,181,986	*	*	*	China
	<i>qT-Toc-1</i>	1	T/C-7,874	227,897,687	*	*	*	China
	<i>qT-Toc-2</i>	2	A/G-11,758	143,273,942	*	*	*	China
	<i>qT-Toc-3</i>	3	T/G-51,195	213,191,036	*	*	*	China
	<i>qT-Toc-4</i>	4	A/G-18,241	34,181,986	*	*	*	China
	<i>qT-Toc-5</i>	5	A/G-25,291	171,214,128	*	*	*	China
	<i>qT-Toc-6</i>	8	A/G-32,502	22,962,134	*	*	*	China
QTL Identified in K22 by C17 RIL population (<i>n</i>=237)								
								(Shutu et al., 2012)
α-Toc	<i>qc1-1</i>	1	PHM2130.29-PHM1950.71	97.59-104.09	4.0	3.9	*	China
	<i>qc5-2</i>	5	PZA01327.1-PZB00869.4	62.04-74.57	5.3	6.2	*	China
	<i>qc5-1</i>	5	PZA00352.23-PZA02060.1	152.75-166.18	24.0	29.6	<i>VTE4</i>	China
	<i>qc6-2</i>	6	PZA02262.3-PZB01308.2	87.7-95.2	4.7	4.7	*	China
	<i>qc5-2</i>	5	PZA03226.3-PZA02207.1	67.14-79.77	4.1	6.1	*	China
	<i>qc5-1</i>	5	PZA00352.23-PZA02060.1	152.75-166.18	12.3	20.1	<i>VTE4</i>	China
	<i>qc1-1</i>	1	PZA00081.18-PZA03189.4	85.05-101.69	4.1	5.5	*	China
	<i>qc5-2</i>	5	PZA01327.1-PHM16854.3	62.04-77.24	14.6	18.2	*	China
γ-Toc	<i>qc5-1</i>	5	PZA00352.23-PZA02060.1	152.75-166.18	7.9	9.8	<i>VTE4</i>	China
	<i>qc2-1</i>	2	PZB00901.3-PZA03228.4	24.02-54.47	4.3	6.0	*	China
	<i>qc5-2</i>	5	PZA01327.1-PHM16854.3	62.04-77.24	11.8	17.6	*	China
	<i>qc5-3</i>	5	PHM3612.19-PHM13639.13	196.03-207.23	4.0	5.2	*	China
	<i>qc7-1</i>	7	PZA03149.4-PZA02643.1	48.86-62.83	6.1	8.8	*	China
	<i>qc5-4</i>	5	PZA01371.1-PZA01327.1	43.04-62.04	5.0	11.0	*	China
	<i>qc5-5</i>	5	PZA00067.10-PZA00148.3	109.1-115.8	10.2	17.3	*	China
	<i>qc5-2</i>	5	PZA01327.1-PHM16854.3	62.04-77.24	15.8	25.0	*	China
T-Toc	<i>qc5-1</i>	5	PZA03161.1-PZA00545.26	144.6-177.68	5.5	7.8	<i>TE4</i>	China
	<i>qc6-1</i>	6	PHM15961.13-PZA03069.8	7.0-25.9	3.8	5.3	*	China
	<i>qc1-1</i>	1	PZA00081.18-PHM1932.51	85.05-118.11	5.3	7.1	*	China
	<i>qc2-2</i>	2	PHM12952.13-PZB00901.4	12.9-25.32	4.1	6.0	*	China
	<i>qc5-4</i>	5	PZA01371.1-PZA01327.1	43.04-62.04	6.5	9.5	*	China
	<i>qc5-2</i>	5	PZA02113.1-PHM13675.17	72.97-90.34	12.5	16.9	*	China
	<i>qc5-1</i>	5	PZA00352.23-PZA02060.1	152.75-166.18	4.3	5.4	<i>VTE4</i>	China
	<i>qc7-1</i>	7	PZA03149.4-PZA02643.1	48.86-62.83	5.3	6.9	*	China
(α/γ)-Toc Ratio	<i>qc5-2</i>	5	PZA01327.1-PHM13675.17	62.04-90.34	14.9	26.5	*	China
	<i>qc5-2</i>	5	PZA01327.1-PZA02207.1	62.04-79.77	11.2	15.5	*	China
	<i>qc5-2</i>	5	PZA01327.1-PHM2769.43	62.04-83.27	6.8	9.2	*	China
	<i>qc6-2</i>	6	PZA01729.1-PZA02328.5	60.5-76.8	4.9	8.7	*	China
	<i>qc8-1</i>	8	PHM934.19-PZA02011.1	69.68-82.39	4.2	5.5	*	China
	<i>qc5-2</i>	5	PZA03298.1-PHM16854.3	68.87-77.24	5.8	10.7	*	China
	<i>qc5-1</i>	5	PZA02751.1-PZA02513.1	151.05-165.68	9.1	18.4	<i>VTE4</i>	China
	<i>qc5-2</i>	5	PZA01327.1-PHM2769.43	62.04-83.27	10.5	12.7	*	China
QTL Identified in K22 by Dan340 RIL population (<i>n</i>=218)	<i>qc5-1</i>	5	PZA00352.23-PZA02015.11	152.75-180.48	19.3	26.0	<i>VTE4</i>	China
	<i>qc6-2</i>	6	PZA00473.5-PZA02262.3	60.4-87.7	6.1	8.3	*	China
α-Toc	<i>qd5-1</i>	5	PZA02751.1-PZA02068.1	151.05-169.78	21.9	52.8	<i>VTE4</i>	China
	<i>qd8-1</i>	8	PZB00592.1-PHM4203.11	76.29-77.22	3.7	5.0		China
	<i>qd5-1</i>	5	PZA02751.1-PZA02068.1	151.05-169.78	5.6	12.4	<i>VTE4</i>	China
	<i>qd1-1</i>	1	PHM3690.23-kip1.3	158.46-190.8	7.3	11.1		China
	<i>qd5-1</i>	5	PZA03161.1-PZA02068.1	144.6-169.78	21.8	39.1	<i>VTE4</i>	China
	<i>qd10-1</i>	10	PZA01642.1-PZA00079.1	28.06-29.45	4.1	5.4		China
	<i>qd1-2</i>	1	PZA02750.3-PHM2187.34	119.28-127.7	4.5	3.0		China

T-Toc	<i>qd1-1</i>	1	PZA02117.1-PHM4926.16	165.46-179.76	35.0	30.8		China	
	<i>qd5-1</i>	5	PZA02751.1-PZA02068.1	151.05-169.78	15.1	12.1	<i>VTE4</i>	China	
	<i>qd8-1</i>	8	PZA02748.3-PZA02011.1	68.92-82.39	6.5	4.4		China	
	<i>qd1-1</i>	1	PHM3690.23-PZB01647.1	158.46-174.76	13.1	23.5		China	
	<i>qd1-2</i>	1	PZA00887.1-PZA00358.12	38.74-49.57	5.3	5.4		China	
	<i>qd1-1</i>	1	PHM3690.23-kipl.3	158.46-190.8	24.3	32.6		China	
	<i>qd2-1</i>	2	PZA03228.4-PHM10404.8	54.47-70.52	3.8	4.1		China	
	<i>qd5-1</i>	5	PZA03161.1-PZA01265.1	144.6-163.15	14.4	18.2	<i>VTE4</i>	China	
	<i>qd1-3</i>	1	PZA02292.1-PZA01267.3	89.29-109.03	4.9	4.0		China	
	<i>qd1-1</i>	1	PHM3690.23-PZB01647.1	158.46-174.76	42.1	50.7		China	
	<i>qd5-2</i>	5	PZA01779.1-PZA00643.13	103.8-107.1	6.2	5.7	<i>HPPD-5</i>	China	
	<i>qd5-1</i>	5	PZA03161.1-PZA01265.1	144.6-163.15	7.5	6.2	<i>VTE4</i>	China	
	<i>qd1-1</i>	1	PHM3690.23-PZB01647.1	158.46-174.76	13.4	25.3		China	
	<i>qd1-4</i>	1	PZA00887.1-PZA00358.12	38.74-49.57	4.7	5.6		China	
	<i>qd1-1</i>	1	PHM3690.23-PZB01647.1	158.46-174.76	24.1	42.5		China	
	<i>qd2-1</i>	2	PZA03228.4-PHM10404.8	54.47-70.52	3.7	4.7		China	
	<i>qd1-1</i>	1	PHM3690.23-PHM4926.16	158.46-179.76	24.2	26.7		China	
	<i>qd5-1</i>	5	PZA02751.1-PZA02068.1	151.05-169.78	24.3	28.2	<i>VTE4</i>	China	
	<i>qd8-1</i>	8	PZB00592.1-LYCE.1	76.29-79.82	4.3	4.3		China	
	<i>qd1-1</i>	1	PHM3690.23-PZB01647.1	158.46-174.76	9.8	17.9		China	
	<i>qd5-1</i>	5	PZA02751.1-PZA02068.1	151.05-169.78	5.5	10.6	<i>VTE4</i>	China	
	<i>qd1-1</i>	1	PHM3690.23-PZB01647.1	158.46-174.76	3.6	4.7		China	
	<i>qd5-1</i>	5	PZA03161.1-PZA02068.1	144.6-169.78	26.8	51.0	<i>VTE4</i>	China	
α-Toc	<i>qα-Toc-1</i>	1	umc1177-bnlg1429	0-2	4.7	20.8	*	China	(Feng et al., 2013)
	<i>qα-Toc-2</i>	2	phi96100-umc1265	0-4	2.8	5.3	*	China	
δ-Toc	<i>qδ-Toc-1</i>	10	umc2180-umc2163	145-148	2.6	4.7	*	China	
γ-Toc	<i>qγ-Toc-1</i>	1	umc1177-bnlg1429	0-7	11.4	32.1	*	China	
	<i>qγ-Toc-2</i>	5	umc2036-HPPD-umc1692	67-112	7.4	13.7	*	China	
T-Toc	<i>qT-Toc-1</i>	1	umc1177-bnlg1429	1-6	6.5	24.6	*	China	
	<i>qT-Toc-2</i>	1	bnlg1811-bnlg2086	92-99	2.7	6.2	*	China	
	<i>qT-Toc-3</i>	5	umc2036-HPPD-umc1692	67-113	8.6	15.4	*	China	
	<i>qT-Toc-4</i>	6	bnlg1740-phi364545	272-301	3.1	6.3	*	China	
(α/γ)-Toc Ratio	<i>q(α/γ)-Toc-1</i>	1	umc1177-bnlg1429	0-1	12.4	41.2	*	China	
	<i>q(α/γ)-Toc-2</i>	2	phi96100-umc1265	0-7	3.1	5.8	*	China	
αT/γT	<i>qαT/γT</i>	1	S1_16043898	16,043,898	7.25E-06	31.0	*	IN, USA	(Lipka et al., 2013)
δT/αT	<i>qδT/αT</i>	1	S1_42184756	42,184,756	7.43E-06	34.0	*	IN, USA	
αT	<i>qαT</i>	1	S1_69880751	69,880,751	8.96E-06	32.0	*	IN, USA	
αT/γT	<i>qαT/γT</i>	1	S1_207726397	207,726,397	3.89E-06	31.0	*	IN, USA	
αT/γT	<i>qαT/γT</i>	1	S1_207726398	207,726,398	3.89E-06	31.0	*	IN, USA	
δT3/(γT3+αT3)	<i>qδT3/(γT3+αT3)</i>	2	S2_71606588	71,606,588	6.14E-06	18.0	*	IN, USA	
αT	<i>qαT</i>	2	S2_196514167	196,514,167	7.19E-06	32.0	*	IN, USA	
αT	<i>qαT</i>	2	S2_219396629	219,396,629	8.33E-06	32.0	*	IN, USA	
αT	<i>qαT</i>	2	S2_219396633	219,396,633	8.33E-06	32.0	*	IN, USA	
γT/(γT+αT)	<i>qγT/(γT+αT)</i>	3	ss196506839	197,518,747	5.72E-06	35.0	*	IN, USA	
δT3	<i>qδT3</i>	5	S5_132656905	132,656,905	2.15E-06	20.0	*	IN, USA	
δT3/(γT3+αT3)	<i>qδT3/(γT3+αT3)</i>	5	S5_133189938	133,189,938	2.29E-06	18.0	*	IN, USA	
δT3	<i>qδT3</i>	5	S5_133331096	133,331,096	1.01E-06	21.0	<i>GRMZM2G105494</i>	IN, USA	
δT3	<i>qδT3</i>	5	S5_133331106	133,331,106	1.01E-06	21.0	<i>GRMZM2G105494</i>	IN, USA	
δT3	<i>qδT3</i>	5	S5_133333397	133,333,397	3.06E-07	22.0	<i>GRMZM2G105494</i>	IN, USA	
δT3	<i>qδT3</i>	5	ss196465626	133,333,397	1.69E-06	21.0	<i>GRMZM2G105494</i>	IN, USA	
δT3/(γT3+αT3)	<i>qδT3/(γT3+αT3)</i>	5	S5_133333397	133,333,397	6.13E-06	18.0	<i>GRMZM2G105494</i>	IN, USA	

$\delta T3$	$q\delta T3$	5	S5_133333561	133,333,561	3.12E-07	22.0	GRMZM2G105494	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_133333561	133,333,561	8.28E-06	17.0	GRMZM2G105494	IN, USA
$\delta T3$	$q\delta T3$	5	S5_133335078	133,335,078	1.34E-06	21.0	GRMZM2G105494	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_133499169	133,499,169	1.77E-06	19.0	GRMZM2G009785	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_133499269	133,499,269	3.66E-06	18.0	GRMZM2G009785	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_133501858	133,501,858	1.29E-07	21.0	GRMZM2G009785	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_133501992	133,501,992	9.72E-07	19.0	GRMZM2G009785	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	PZB00969.1	133,502,506	8.27E-07	19.0	GRMZM2G009785	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	ss196465634	133,510,613	7.54E-06	17.0	GRMZM2G009785	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	PZB02491.1	133,517,065	6.69E-06	18.0	GRMZM2G009785	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_133618308	133,618,308	7.89E-06	17.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_133618309	133,618,309	7.89E-06	17.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_133618344	133,618,344	7.89E-06	17.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_133691297	133,691,297	5.02E-06	18.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_133776316	133,776,316	6.51E-07	19.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_134191258	134,191,258	1.66E-06	19.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_134195301	134,195,301	2.92E-06	18.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_134471200	134,471,200	1.13E-06	19.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_134489952	134,489,952	1.13E-06	19.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_134751850	134,751,850	2.34E-06	18.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_134751883	134,751,883	7.69E-06	17.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_134751924	134,751,924	6.83E-06	18.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_134787527	134,787,527	6.62E-06	18.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_135908766	135,908,766	8.47E-06	17.0	*	IN, USA
$\delta T3/(\gamma T3+\alpha T3)$	$q\delta T3/(\gamma T3+\alpha T3)$	5	S5_135908783	135,908,783	8.47E-06	17.0	*	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	S5_190739882	190,739,882	1.15E-06	36.0	GRMZM2G031952	IN, USA
$\alpha T/\gamma T$	$q\alpha T/\gamma T$	5	S5_190739882	190,739,882	7.45E-06	31.0	GRMZM2G031952	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	S5_190739951	190,739,951	9.59E-08	37.0	GRMZM2G031952	IN, USA
$\alpha T/\gamma T$	$q\alpha T/\gamma T$	5	S5_190739951	190,739,951	5.40E-07	33.0	GRMZM2G031952	IN, USA
αT	$q\alpha T$	5	S5_198205644	198,205,644	3.56E-06	32.0	GRMZM2G058943	IN, USA
αT	$q\alpha T$	5	S5_199647093	199,647,093	3.54E-06	32.0	GRMZM5G823157	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	S5_199647093	199,647,093	4.26E-06	34.0	GRMZM5G823157	IN, USA
$\alpha T/\gamma T$	$q\alpha T/\gamma T$	5	S5_199706178	199,706,178	1.07E-06	32.0	*	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	S5_199706178	199,706,178	1.22E-06	36.0	*	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	S5_199706178	199,706,178	1.68E-06	35.0	*	IN, USA
$\alpha T/\gamma T$	$q\alpha T/\gamma T$	5	S5_199706244	199,706,244	8.86E-06	31.0	*	IN, USA
αT	$q\alpha T$	5	S5_200114137	200,114,137	2.63E-07	34.0	GRMZM2G108996	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	S5_200293693	200,293,693	1.24E-06	36.0	GRMZM2G034876	IN, USA
αT	$q\alpha T$	5	S5_200293693	200,293,693	3.33E-06	32.0	GRMZM2G034876	IN, USA
$\alpha T/\gamma T$	$q\alpha T/\gamma T$	5	S5_200293693	200,293,693	8.10E-06	31.0	GRMZM2G034876	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	ss196468356	200,300,836	6.33E-06	34.0	*	IN, USA
αT	$q\alpha T$	5	S5_200318615	200,318,615	1.05E-06	33.0	*	IN, USA
$\alpha T/\gamma T$	$q\alpha T/\gamma T$	5	S5_200318615	200,318,615	2.50E-06	32.0	*	IN, USA
αT	$q\alpha T$	5	ss196416269	200,367,532	7.36E-14	44.0	GRMZM2G035213	IN, USA
αT	$q\alpha T$	5	PZB02283.1	200,367,532	7.36E-14	44.0	GRMZM2G035213	IN, USA
$\alpha T/\gamma T$	$q\alpha T/\gamma T$	5	PZB02283.1	200,367,532	9.21E-13	42.0	GRMZM2G035213	IN, USA
$\alpha T/\gamma T$	$q\alpha T/\gamma T$	5	ss196416269	200,367,532	9.21E-13	42.0	GRMZM2G035213	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	PZB02283.1	200,367,532	4.82E-12	44.0	GRMZM2G035213	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	ss196416269	200,367,532	4.82E-12	44.0	GRMZM2G035213	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	PZB02283.1	200,367,532	1.88E-11	42.0	GRMZM2G035213	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	ss196416269	200,367,532	1.88E-11	42.0	GRMZM2G035213	IN, USA
αT	$q\alpha T$	5	ss196468362	200,369,124	7.36E-14	44.0	GRMZM2G035213	IN, USA

$\alpha T/\gamma T$	$qaT/\gamma T$	5	ss196468362	200,369,124	9.21E-13	42.0	GRMZM2G035213	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	ss196468362	200,369,124	4.82E-12	44.0	GRMZM2G035213	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	ss196468362	200,369,124	1.88E-11	42.0	GRMZM2G035213	IN, USA
αT	qaT	5	S5_200369481	200,369,481	1.97E-08	35.0	GRMZM2G035213	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_200369481	200,369,481	7.24E-07	32.0	GRMZM2G035213	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	S5_200369481	200,369,481	6.15E-09	39.0	GRMZM2G035213	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	S5_200369481	200,369,481	7.21E-07	35.0	GRMZM2G035213	IN, USA
αT	qaT	5	S5_200369508	200,369,508	6.85E-07	33.0	GRMZM2G035213	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_200369508	200,369,508	9.69E-07	32.0	GRMZM2G035213	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	S5_200369508	200,369,508	6.57E-07	36.0	GRMZM2G035213	IN, USA
αT	qaT	5	S5_200369534	200,369,534	2.59E-06	32.0	GRMZM2G035213	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_200369534	200,369,534	5.45E-06	31.0	GRMZM2G035213	IN, USA
αT	qaT	5	S5_200369625	200,369,625	5.00E-08	35.0	GRMZM2G035213	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	S5_200369625	200,369,625	2.02E-06	35.0	GRMZM2G035213	IN, USA
αT	qaT	5	S5_200369644	200,369,644	9.36E-06	32.0	GRMZM2G035213	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_200369644	200,369,644	9.97E-06	31.0	GRMZM2G035213	IN, USA
αT	qaT	5	S5_200369665	200,369,665	9.36E-06	32.0	GRMZM2G035213	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_200369665	200,369,665	9.97E-06	31.0	GRMZM2G035213	IN, USA
αT	qaT	5	S5_200369667	200,369,667	1.67E-07	34.0	GRMZM2G035213	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_200369667	200,369,667	1.70E-07	33.0	GRMZM2G035213	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	S5_200369667	200,369,667	7.09E-06	34.0	GRMZM2G035213	IN, USA
αT	qaT	5	PZB02424.2	200,370,309	4.09E-07	33.0	GRMZM2G035213	IN, USA
αT	qaT	5	ss196468368	200,371,057	6.73E-06	32.0	GRMZM2G035213	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	ss196468368	200,371,057	7.37E-06	31.0	GRMZM2G035213	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	S5_200382168	200,382,168	9.59E-09	39.0	GRMZM2G167431	IN, USA
αT	qaT	5	S5_200382168	200,382,168	3.01E-08	35.0	GRMZM2G167431	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_200382168	200,382,168	3.08E-08	34.0	GRMZM2G167431	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	S5_200382168	200,382,168	6.31E-08	37.0	GRMZM2G167431	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	S5_200435108	200,435,108	1.13E-10	42.0	GRMZM2G325001	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_200435108	200,435,108	3.28E-10	38.0	GRMZM2G325001	IN, USA
αT	qaT	5	S5_200435108	200,435,108	4.39E-10	38.0	GRMZM2G325001	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	S5_200435108	200,435,108	6.37E-09	39.0	GRMZM2G325001	IN, USA
αT	qaT	5	S5_200435117	200,435,117	1.21E-07	34.0	GRMZM2G325001	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	S5_200435117	200,435,117	1.66E-07	37.0	GRMZM2G325001	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_200435117	200,435,117	1.79E-07	33.0	GRMZM2G325001	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	S5_200435117	200,435,117	7.93E-07	35.0	GRMZM2G325001	IN, USA
αT	qaT	5	ss196468352	200,435,300	8.32E-10	38.0	GRMZM2G325019	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	ss196468352	200,435,300	7.67E-09	39.0	GRMZM2G325019	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	ss196468352	200,435,300	2.68E-08	35.0	GRMZM2G325019	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	ss196468352	200,435,300	2.87E-08	38.0	GRMZM2G325019	IN, USA
αT	qaT	5	S5_200437468	200,437,468	2.29E-08	35.0	GRMZM2G325019	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	S5_200437468	200,437,468	4.13E-08	38.0	GRMZM2G325019	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_200437468	200,437,468	9.02E-08	34.0	GRMZM2G325019	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	S5_200437468	200,437,468	3.72E-07	36.0	GRMZM2G325019	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	ss196517251	200,437,606	4.45E-07	33.0	GRMZM2G325019	IN, USA
αT	qaT	5	ss196517251	200,437,606	1.38E-06	33.0	GRMZM2G325019	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	ss196517251	200,437,606	2.99E-06	35.0	GRMZM2G325019	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	ss196517251	200,437,606	5.53E-06	34.0	GRMZM2G325019	IN, USA
αT	qaT	5	S5_200438801	200,438,801	4.30E-06	32.0	GRMZM2G325038	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_200438801	200,438,801	7.67E-06	31.0	GRMZM2G325038	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_204064933	204,064,933	3.15E-08	34.0	GRMZM2G161641	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	S5_204064933	204,064,933	3.32E-07	36.0	GRMZM2G161641	IN, USA

αT	qaT	5	S5_204064933	204,064,933	1.16E-06	33.0	GRMZM2G161641	IN, USA	
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	S5_204064933	204,064,933	8.84E-07	35.0	GRMZM2G161641	IN, USA	
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_204065009	204,065,009	3.42E-07	33.0	GRMZM2G161641	IN, USA	
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	S5_204065009	204,065,009	3.87E-07	36.0	GRMZM2G161641	IN, USA	
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	S5_204065009	204,065,009	1.74E-06	35.0	GRMZM2G161641	IN, USA	
αT	qaT	5	S5_204065009	204,065,009	4.64E-06	32.0	GRMZM2G161641	IN, USA	
$\delta T/\alpha T$	$q\delta T/\alpha T$	5	S5_204065055	204,065,055	4.68E-08	37.0	GRMZM2G161641	IN, USA	
$\alpha T/\gamma T$	$qaT/\gamma T$	5	S5_204065055	204,065,055	2.36E-06	32.0	GRMZM2G161641	IN, USA	
$\alpha T/\gamma T$	$qaT/\gamma T$	6	S6_149776596	149,776,596	9.71E-07	32.0	*	IN, USA	
αT	qaT	6	S6_149776596	149,776,596	6.87E-06	32.0	*	IN, USA	
$\alpha T/\gamma T$	$qaT/\gamma T$	6	S6_149776597	149,776,597	4.37E-06	31.0	*	IN, USA	
αT	qaT	6	S6_149776597	149,776,597	1.03E-05	31.0	*	IN, USA	
$\alpha T/\gamma T$	$qaT/\gamma T$	7	ss196475603	13,959,219	1.25E-05	31.0	*	IN, USA	
$\alpha T/\gamma T$	$qaT/\gamma T$	8	ss196486649	128,548,850	7.50E-06	31.0	*	IN, USA	
$\gamma T3$	$q\gamma T3$	9	S9_92718671	92,718,671	4.48E-07	28.0	GRMZM5G833760	IN, USA	
$\gamma T3$	$q\gamma T3$	9	S9_92718674	92,718,674	4.48E-07	28.0	GRMZM5G833760	IN, USA	
$\gamma T3$	$\gamma T3$	9	S9_92718709	92,718,709	4.48E-07	28.0	GRMZM5G833760	IN, USA	
Total								IN, USA	
Tocotrienols	qT -Tocotrienols	9	S9_107839821	107,839,821	2.00E-07	30.0	*	IN, USA	
$\alpha T/\gamma T$	$qaT/\gamma T$	9	S9_151726463	151,726,463	4.81E-06	31.0	*	IN, USA	
$\alpha T/\gamma T$	$qaT/\gamma T$	9	S9_151726511	151,726,511	1.07E-05	31.0	*	IN, USA	
$\alpha T/\gamma T$	$qaT/\gamma T$	9	S9_151726870	151,726,870	9.55E-06	31.0	*	IN, USA	
$\alpha T/\gamma T$	$qaT/\gamma T$	9	S9_155585508	155,585,508	2.62E-06	32.0	*	IN, USA	
$\delta T/\alpha T$	$q\delta T/\alpha T$	9	S9_155585508	155,585,508	2.75E-06	35.0	*	IN, USA	
$\delta T/\alpha T$	$q\delta T/\alpha T$	10	S10_129705301	129,705,301	6.39E-06	34.0	*	IN, USA	
$\delta T/\alpha T$	$q\delta T/\alpha T$	10	S10_129705304	129,705,304	6.39E-06	34.0	*	IN, USA	
αT	qaT -1	1	S_30027714	48.9	1.21	29.53	Chorismate synthase	IN, USA	(Diepenbrock et al., 2017)
	qaT -2	1	S_230132209	136.3	0.01	27.18	*	IN, USA	
	qaT -3	2	S_210456683	116.3	0.01	26.32	*	IN, USA	
	qaT -4	3	S_160847275	72.4	0.01	24.09	*	IN, USA	
	qaT -5	3	S_188410390	98	0.01	22.92	4-diphosphocytidyl-2-C-methyl-D-erythritol kinase, chorismate mutase	IN, USA	
	qaT -6	4	S_13319985	35.2	0.02	39.60	*	IN, USA	
	qaT -7	4	S_171741420	79	0.01	30.45	*	IN, USA	
	qaT -8	5	S_24668030	53.9	0.01	25.70	*	IN, USA	
	qaT -9	5	S_200356718	106.8	0.48	755.11	Gamma-tocopherol methyltransferase (VTE4)	IN, USA	
	qaT -10	6	S_140347572	54.4	0.01	32.73	*	IN, USA	
	qaT -11	7	S_140150735	73	0.02	44.64	*	IN, USA	
	qaT -12	8	S_141756913	71.6	0.02	50.62	*	IN, USA	
	qaT -13	9	S_27141915	43.6	0.02	40.57	Arogenate/prephenate dehydrogenase family protein, Homogentisate 1,2-dioxygenase	IN, USA	
δT	$q\delta T$ -1	1	S_32200366	51.2	0.01	22.23	Chorismate synthase	IN, USA	
	$q\delta T$ -2	1	S_174102804	94.3	0.08	136.26	MPBQ/MSBQ methyl transferase (VTE3)	IN, USA	
	$q\delta T$ -3	1	S_227227502	133.8	0.06	99.97	*	IN, USA	
	$q\delta T$ -4	2	S_37143380	65.7	0.01	24.02	*	IN, USA	
	$q\delta T$ -5	2	S_210003103	115.7	0.04	78.35	*	IN, USA	
	$q\delta T$ -6	3	S_173244742	82.1	0.01	22.78	Prephenate amino transferase	IN, USA	

γT	<i>qδT-7</i>	4	S_26785112	48.4	0.01	22.44		IN, USA
	<i>qδT-8</i>	5	S_25536964	54.2	0.14	167.62		IN, USA
	<i>qδT-9</i>	5	S_133824940	70.9	0.05	55.83	Tocopherol cyclase (VTE1)	IN, USA
	<i>qδT-10</i>	5	S_196287168	103.8	0.02	22.55	2-C-methyl-D-erythritol 2,4-cyclodiphosphate synthase	IN, USA
	<i>qδT-11</i>	5	S_204809285	114	0.03	34.17	*	IN, USA
	<i>qδT-12</i>	6	S_108619629	32.1	0.02	32.38	*	IN, USA
	<i>qδT-13</i>	6	S_159984809	83.9	0.01	19.62	*	IN, USA
	<i>qδT-14</i>	7	S_34185670	48.1	0.02	45.62	Chlorophyllase, 4-hydroxyphenylpyruvate dioxygenase	IN, USA
	<i>qδT-15</i>	9	S_31124337	44.6	0.04	62.90	homogentisate 1,2-dioxygenase	IN, USA
	<i>qδT-16</i>	9	S_149164320	93.4	0.02	33.30	*	IN, USA
	<i>qδT-17</i>	10	S_78533820	38.7	0.01	22.17	*	IN, USA
	<i>qδT-18</i>	10	S_144982565	83.1	0.02	42.59	*	IN, USA
	<i>qγT-1</i>	1	S_12293829	24.4	0.01	19.24	Solanesyl diphosphate synthase	IN, USA
	<i>qγT-2</i>	1	S_32578218	51.6	0.02	34.62	Chorismate synthase	IN, USA
	<i>qγT-3</i>	1	S_227227502	133.8	0.11	210.16	*	IN, USA
	<i>qγT-4</i>	2	S_32255033	62.8	0.01	28.09	*	IN, USA
	<i>qγT-5</i>	2	S_195781723	103.9	0.02	22.98	3-dehydroquinate synthase	IN, USA
	<i>qγT-6</i>	2	S_209749910	115.5	0.08	95.76		IN, USA
	<i>qγT-7</i>	3	S_25884552	52.5	0.01	21.59		IN, USA
	<i>qγT-8</i>	3	S_199624131	104.9	0.01	18.78	Chorismate mutase	IN, USA
	<i>qγT-9</i>	4	S_27272892	48.6	0.02	36.57	*	IN, USA
	<i>qγT-10</i>	5	S_25247319	54.1	0.18	#####	*	IN, USA
	<i>qγT-11</i>	5	S_90566175	69.5	0.01	19.09	Chorismate mutase, Tyrosine transaminase, 4-hydroxyphenylpyruvate dioxygenase, Tocopherol cyclase (VTE1)	IN, USA
	<i>qγT-12</i>	5	S_200161433	106.7	0.03	54.04	Gamma-tocopherol methyltransferase (VTE4)	IN, USA
	<i>qγT-13</i>	6	S_75052175	10.3	0.01	20.75	Arogenate/prephenate dehydrogenase family protein	IN, USA
	<i>qγT-14</i>	6	S_118012160	43.2	0.02	34.36	*	IN, USA
	<i>qγT-15</i>	6	S_157048924	76.4	0.01	22.27	*	IN, USA
	<i>qγT-16</i>	7	S_129999310	64.4	0.01	22.35	*	IN, USA
	<i>qγT-17</i>	8	S_136940374	70	0.01	31.19	*	IN, USA
	<i>qγT-18</i>	9	S_94334531	47.4	0.03	46.94	Homogentisic acid geranylgeranyl transferase 1 (HGGT1)	IN, USA
	<i>qγT-19</i>	9	S_138294095	70	0.01	21.21	Arogenate/prephenate dehydratase	IN, USA
	<i>qγT-20</i>	10	S_24852570	35.4	0.02	38.14	Shikimate biosynthesis protein aroDE, maleylacetoacetate isomerase	IN, USA
TotalT	<i>qγT-21</i>	10	S_144982565	83.1	0.02	37.56	*	IN, USA
	<i>qTotalT-1</i>	1	S_33258826	52.5	0.02	35.59	Chorismate synthase	IN, USA
	<i>qTotalT-2</i>	1	S_227227502	133.8	0.10	175.70	*	IN, USA
	<i>qTotalT-3</i>	2	S_22420256	53.6	0.01	23.98	*	IN, USA
	<i>qTotalT-4</i>	2	S_195781723	103.9	0.02	20.02	3-dehydroquinate synthase	IN, USA
	<i>qTotalT-5</i>	2	S_209749910	115.5	0.07	78.34	*	IN, USA

α T3	<i>qTotalT-6</i>	3	S_24965860	52.2	0.01	23.49	*	IN, USA
	<i>qTotalT-7</i>	3	S_190652083	99.4	0.01	21.57	Chorismate mutase	IN, USA
	<i>qTotalT-8</i>	4	S_29529943	49.5	0.02	34.82	*	IN, USA
	<i>qTotalT-9</i>	5	S_25247319	54.1	0.18	####	*	IN, USA
	<i>qTotalT-10</i>	5	S_145388055	72.3	0.01	21.61	Chorismate mutase, tocopherol cyclase (VTE1)	IN, USA
	<i>qTotalT-11</i>	6	S_75052175	10.3	0.01	18.03	Arogenate/prephenate dehydrogenase family protein	IN, USA
	<i>qTotalT-12</i>	6	S_117936528	43.1	0.02	30.59	*	IN, USA
	<i>qTotalT-13</i>	6	S_157048924	76.4	0.01	19.25	*	IN, USA
	<i>qTotalT-14</i>	8	S_143642609	72.8	0.02	34.52	*	IN, USA
	<i>qTotalT-15</i>	9	S_94334531	47.4	0.03	49.65	Homogentisic acid geranylgeranyl transferase 1 (HGGT1)	IN, USA
	<i>qTotalT-16</i>	9	S_138294095	70	0.01	22.48	Arogenate/prephenate dehydratase	IN, USA
	<i>qTotalT-17</i>	10	S_24852570	35.4	0.02	32.71	Shikimate biosynthesis protein aroDE, maleylacetoacetate isomerase	IN, USA
	<i>qTotalT-18</i>	10	S_144982565	83.1	0.02	33.65	*	IN, USA
	<i>qaT3-1</i>	1	S_37464200	55.7	0.01	25.24	*	IN, USA
	<i>qaT3-2</i>	1	S_259191668	155.1	0.02	27.53	*	IN, USA
	<i>qaT3-3</i>	1	S_280349239	172.7	0.01	23.22	*	IN, USA
	<i>qaT3-4</i>	2	S_39280552	67.1	0.01	21.67	*	IN, USA
	<i>qaT3-5</i>	3	S_143898953	63.7	0.03	59.29	*	IN, USA
	<i>qaT3-6</i>	3	S_229858254	153.8	0.01	30.65	*	IN, USA
	<i>qaT3-7</i>	4	S_75010949	56.6	0.02	51.01	Chorismate mutase	IN, USA
	<i>qaT3-8</i>	5	S_73132746	65.9	0.02	30.98	Light harvesting-like protein 3, argenatate/prephenate dehydrogenase family protein, argenatate/prephenate dehydrogenase family protein	IN, USA
	<i>qaT3-9</i>	5	S_200356718	106.8	0.32	*	Gamma-tocopherol methyltransferase (VTE4)	IN, USA
	<i>qaT3-10</i>	6	S_108288402	31.9	0.01	20.52	*	IN, USA
	<i>qaT3-11</i>	6	S_161454721	86.6	0.01	21.68	*	IN, USA
	<i>qaT3-12</i>	7	S_84844392	49.3	0.03	66.87	*	IN, USA
	<i>qaT3-13</i>	7	S_171757675	121.1	0.01	26.28	*	IN, USA
	<i>qaT3-14</i>	8	S_173864256	129.7	0.01	20.60	*	IN, USA
	<i>qaT3-15</i>	9	S_87459733	46.3	0.03	65.31	*	IN, USA
	<i>qaT3-16</i>	10	S_94411157	24.8	0.02	29.26	*	IN, USA
	<i>qaT3-17</i>	10	S_113911262	45.4	0.01	22.83	Arogenate/prephenate dehydratase	IN, USA
δ T3	<i>qδT3-1</i>	1	S_5804545	10.2	0.02	41.07	*	IN, USA
	<i>qδT3-2</i>	1	S_16005600	32.0	0.01	21.51	*	IN, USA
	<i>qδT3-3</i>	1	S_174102804	94.3	0.02	49.72	MPBQ/MSBQ methyl transferase (VTE3)	IN, USA
	<i>qδT3-4</i>	1	S_227978512	134.4	0.01	27.05	*	IN, USA
	<i>qδT3-5</i>	1	S_289692611	185.1	0.01	19.76	*	IN, USA
	<i>qδT3-6</i>	3	S_58294211	57.6	0.01	21.73	1-deoxy-D-xylulose 5-phosphate reductoisomerase, geranylgeranyl hydrogenase, shikimate biosynthesis protein aroDE	IN, USA
	<i>qδT3-7</i>	3	S_201306180	106.7	0.01	18.79	*	IN, USA
	<i>qδT3-8</i>	4	S_86504397	57.6	0.01	32.72	Chorismate mutase	IN, USA
	<i>qδT3-9</i>	5	S_1491318	1.7	0.01	35.45	*	IN, USA

γT3	<i>qδT3-10</i>	5	S_18348509	48.9	0.01	19.19	*	IN, USA
	<i>qδT3-11</i>	5	S_83712444	68.5	0.11	182.20	4-hydroxyphenylpyruvate dioxygenase	IN, USA
	<i>qδT3-12</i>	5	S_204809285	114.0	0.03	71.91	*	IN, USA
	<i>qδT3-13</i>	6	S_72953671	10.1	0.03	60.38	*	IN, USA
	<i>qδT3-14</i>	6	S_111902384	36.5	0.01	26.36	*	IN, USA
	<i>qδT3-15</i>	6	S_160013836	84.0	0.01	21.96	*	IN, USA
	<i>qδT3-16</i>	7	S_13934903	40.5	0.06	65.80	1-deoxy-D-xylulose 5-phosphate synthase 2 (dxs2)	IN, USA
	<i>qδT3-17</i>	7	S_31773777	48.0	0.07	72.38	*	IN, USA
	<i>qδT3-18</i>	8	S_144742598	73.5	0.01	20.71	*	IN, USA
	<i>qδT3-19</i>	8	S_173232589	128.0	0.01	24.20	Chorismate mutase, chorismate mutase	IN, USA
	<i>qδT3-20</i>	9	S_92175763	47.0	0.24	####	Homogentisic acid geranylgeranyl transferase 1 (HGGT1)	IN, USA
	<i>qδT3-21</i>	10	S_16505881	33.3	0.01	28.96	*	IN, USA
	<i>qγT3-1</i>	1	S_77561162	79.9	0.02	52.52	*	IN, USA
	<i>qγT3-2</i>	1	S_228086777	134.5	0.01	16.61	*	IN, USA
	<i>qγT3-3</i>	2	S_39891173	67.5	0.01	18.26	Arogenate/prephenate dehydratase	IN, USA
	<i>qγT3-4</i>	3	S_122684562	59.5	0.01	19.08	*	IN, USA
	<i>qγT3-5</i>	4	S_40700355	54	0.01	31.41	*	IN, USA
	<i>qγT3-6</i>	5	S_22579093	52.6	0.01	19.40	*	IN, USA
	<i>qγT3-7</i>	5	S_84251695	68.6	0.08	144.13	4-hydroxyphenylpyruvate dioxygenase	IN, USA
	<i>qγT3-8</i>	5	S_200356718	106.8	0.04	100.56	Gamma-tocopherol methyltransferase (VTE4)	IN, USA
	<i>qγT3-9</i>	6	S_82648835	11.5	0.03	64.73	Arogenate/prephenate dehydrogenase family protein	IN, USA
	<i>qγT3-10</i>	6	S_132730267	51.1	0.01	25.92	ABC kinase (tocopherol cyclase kinase)	IN, USA
	<i>qγT3-11</i>	7	S_14043551	40.6	0.05	139.07	1-deoxy-D-xylulose 5-phosphate synthase 2 (dxs2)	IN, USA
	<i>qγT3-12</i>	8	S_173232589	128	0.01	25.49	Chorismate mutase, chorismate mutase	IN, USA
	<i>qγT3-13</i>	9	S_92175763	47	0.40	731.30	Homogentisic acid geranylgeranyl transferase 1 (HGGT1)	IN, USA
	<i>qγT3-14</i>	10	S_14819626	32.4	0.01	27.47	*	IN, USA
TotalT3	<i>qTotalT3-1</i>	1	S_77561162	79.9	0.01	23.29	*	IN, USA
	<i>qTotalT3-2</i>	2	S_40196483	67.7	0.01	19.61	*	IN, USA
	<i>qTotalT3-3</i>	3	S_144813964	63.8	0.01	20.20	shikimate biosynthesis protein aroDE, shikimate biosynthesis protein aroDE	IN, USA
	<i>qTotalT3-4</i>	4	S_40700355	54	0.01	32.35	*	IN, USA
	<i>qTotalT3-5</i>	5	S_59819753	62.8	0.02	17.36	Arogenate/prephenate dehydrogenase family protein, Arogenate/prephenate dehydrogenase family protein	IN, USA
	<i>qTotalT3-6</i>	5	S_84251695	68.6	0.10	82.46	4-hydroxyphenylpyruvate dioxygenase	IN, USA
	<i>qTotalT3-7</i>	6	S_82648835	11.5	0.03	57.91	Arogenate/prephenate dehydrogenase family protein	IN, USA
	<i>qTotalT3-8</i>	6	S_132730267	51.1	0.01	19.26	1-deoxy-D-xylulose 5-phosphate synthase 1 (dxs1), isopentenyl pyrophosphate isomerase, ABC kinase (tocopherol cyclase kinase)	IN, USA
	<i>qTotalT3-9</i>	7	S_13934903	40.5	0.06	123.32	1-deoxy-D-xylulose 5-phosphate synthase 2 (dxs2)	IN, USA
	<i>qTotalT3-10</i>	8	S_170044134	114.2	0.01	25.70		IN, USA
	<i>qTotalT3-11</i>	9	S_92175763	47	0.39	####	Homogentisic acid geranylgeranyl transferase 1 (HGGT1)	IN, USA

TotalT+T3	<i>qTotalT3-12</i>	10	S_108093611	43.9	0.01	28.52	Arogenate/prephenate dehydratase	IN, USA
	<i>qTotalT+T3-1</i>	1	S_32578218	51.6	0.02	26.56	Chorismate synthase	IN, USA
	<i>qTotalT+T3-2</i>	1	S_173178805	94	0.01	23.62	3-deoxy-d-arabino-heptulosonate 7-phosphate synthase, MPBQ/MSBQ methyl transferase (VTE3)	IN, USA
	<i>qTotalT+T3-3</i>	1	S_228086777	134.5	0.06	94.22	*	IN, USA
	<i>qTotalT+T3-4</i>	2	S_185246926	92.1	0.01	18.60	*	IN, USA
	<i>qTotalT+T3-5</i>	2	S_210003103	115.7	0.04	62.49	*	IN, USA
	<i>qTotalT+T3-6</i>	3	S_181011607	90.8	0.01	19.65	*	IN, USA
	<i>qTotalT+T3-7</i>	4	S_41538292	54.1	0.02	42.65	*	IN, USA
	<i>qTotalT+T3-8</i>	5	S_2437804	5.4	0.01	17.91	*	IN, USA
	<i>qTotalT+T3-9</i>	5	S_25247319	54.1	0.12	138.56	*	IN, USA
	<i>qTotalT+T3-10</i>	5	S_84885005	68.7	0.03	41.03	Chorismate mutase, 4-hydroxyphenylpyruvate dioxygenase	IN, USA
	<i>qTotalT+T3-11</i>	5	S_204322970	111.9	0.01	17.58	*	IN, USA
	<i>qTotalT+T3-12</i>	6	S_75052175	10.3	0.01	22.55	Arogenate/prephenate dehydrogenase family protein	IN, USA
	<i>qTotalT+T3-13</i>	6	S_109778922	32.8	0.02	16.99	*	IN, USA
	<i>qTotalT+T3-14</i>	6	S_127663433	47.2	0.02	20.89	*	IN, USA
	<i>qTotalT+T3-15</i>	7	S_10636101	35.4	0.02	46.30	1-deoxy-D-xylulose 5-phosphate synthase 2 (dxs2)	IN, USA
	<i>qTotalT+T3-16</i>	8	S_9998058	25.7	0.01	18.23	*	IN, USA
	<i>qTotalT+T3-17</i>	8	S_143642609	72.8	0.01	26.14	*	IN, USA
	<i>qTotalT+T3-18</i>	9	S_94016922	47.3	0.09	153.24	Homogentisic acid geranylgeranyl transferase 1 (HGGT1)	IN, USA
PC-8	<i>qTotalT+T3-19</i>	10	S_14993749	32.5	0.01	25.88	*	IN, USA
	<i>qTotalT+T3-20</i>	10	S_145163581	83.8	0.01	25.53	*	IN, USA
	<i>qPC-8-1</i>	1	S_11167845	22.2	0.02	23.47	Solanesyl diphosphate synthase	IN, USA
	<i>qPC-8-2</i>	2	S_219507883	129.3	0.01	15.01	*	IN, USA
	<i>qPC-8-3</i>	3	S_161788660	73.3	0.02	25.03	*	IN, USA
	<i>qPC-8-4</i>	5	S_1824267	2.6	0.01	16.61	*	IN, USA
	<i>qPC-8-5</i>	5	S_140093904	71.2	0.04	42.15	Chorismate mutase, tocopherol cyclase (VTE1)	IN, USA
	<i>qPC-8-6</i>	6	S_165195245	101.9	0.03	36.09	*	IN, USA
	<i>qPC-8-7</i>	7	S_14912737	41.4	0.04	42.78	1-deoxy-D-xylulose 5-phosphate synthase 2 (dxs2)	IN, USA
	<i>qPC-8-8</i>	9	S_20333901	36.1	0.03	30.03	1-deoxy-D-xylulose 5-phosphate synthase 3 (dxs3)	IN, USA
QTL Identified in the N6 by NC296 RIL population (n=213)								
$\delta T/\alpha T$	<i>q\delta T/\alpha T</i>	1	*	18.8–23.9	4.60	2.61	*	IN, USA
$\delta T3$	<i>q\delta T3</i>	1	*	28.9–34.2	4.46	1.24	*	IN, USA
TT	<i>qTT</i>	1	*	28.8–35	4.42	2.31	*	IN, USA
$TT3$	<i>qTT3</i>	1	*	112.5–121.5	3.98	4.62	*	IN, USA
$\alpha T/\gamma T$	<i>q\alpha T/\gamma T</i>	5	*	42.3–47	7.33	4.57	*	IN, USA
δT	<i>q\delta T</i>	5	*	46.9–50	7.84	20.20	<i>ZmVTE4</i>	IN, USA
γT	<i>q\gamma T</i>	5	*	47.9–49.6	12.48	24.97	<i>ZmVTE4</i>	IN, USA
$\gamma T/(\gamma T+\alpha T)$	<i>q\gamma T/(\gamma T+\alpha T)</i>	5	*	47.9–49.3	30.07	52.85	<i>ZmVTE4</i>	IN, USA
$\delta T/\alpha T$	<i>q\delta T/\alpha T</i>	5	*	50–53.1	4.87	13.29	*	IN, USA
$\delta T/(\gamma T+\alpha T)$	<i>q\delta T/(\gamma T+\alpha T)</i>	5	*	56.1–60.2	5.13	12.98	*	IN, USA
$\alpha T3/\gamma T3$	<i>q\alpha T3/\gamma T3</i>	5	*	56.6–60.9	12.49	19.80	*	IN, USA
$\gamma T3/(\gamma T3+\alpha T3)$	<i>q\gamma T3/(\gamma T3+\alpha T3)</i>	5	*	57.7–60.9	15.75	26.56	*	IN, USA
$\alpha T3$	<i>q\alpha T3</i>	5	*	59.8–63.9	6.43	13.97	*	IN, USA

(Fenton et al., 2018)

TT+TT3	<i>qTT+TT3</i>	5	*	75.6–78.6	3.98	7.01	*	IN, USA
δT3/(γT3+αT3)	<i>qδT3/(γT3+αT3)</i>	5	*	83.4–86.4	4.54	8.90	*	IN, USA
δT3/γT3	<i>qδT3/γT3</i>	5	*	83.4–86.4	4.54	8.90	*	IN, USA
γT	<i>qγT</i>	5	*	99.4–102.5	11.93	25.65	*	IN, USA
αT	<i>qαT</i>	5	*	95.9–103.6	4.39	5.53	*	IN, USA
TT3	<i>qTT3</i>	5	*	98.8–103.5	12.17	23.70	*	IN, USA
TT/TT3	<i>qTT/TT3</i>	5	*	100.8–107.4	10.53	16.40	*	IN, USA
δT/γT	<i>qδT/γT</i>	6	*	57.7–59	4.64	6.15	*	IN, USA
TT+TT3	<i>qTT+TT3</i>	7	*	66.6–72.5	5.07	2.04	*	IN, USA
γT3	<i>qγT3</i>	7	*	69.6–72.2	6.63	0.78	*	IN, USA
TT	<i>qTT</i>	7	*	69.4–73.9	5.98	2.46	*	IN, USA
γT3/(γT3+αT3)	<i>qγT3/(γT3+αT3)</i>	9	*	51.9–55.9	13.54	19.58	*	IN, USA
αT3/γT3	<i>qαT3/γT3</i>	9	*	56.2–59.3	9.37	14.16	*	IN, USA
TT3	<i>qTT3</i>	9	*	62.8–65.6	14.83	21.67	<i>ZmVTE2</i>	IN, USA
TT/TT3	<i>qTT/TT3</i>	9	*	61–65.4	8.24	8.01	<i>ZmVTE2</i>	IN, USA
δT3	<i>qδT3</i>	9	*	67–74.8	8.14	17.32	<i>ZmHGGT1</i>	IN, USA
δT3/(γT3+αT3)	<i>qδT3/(γT3+αT3)</i>	9	*	68.4–73.5	11.71	25.05	<i>ZmHGGT1</i>	IN, USA
δT3/γT3	<i>qδT3/γT3</i>	9	*	68.4–73.5	11.71	25.05	<i>ZmHGGT1</i>	IN, USA
QTL Identified in the E2558 by Co125 RIL population (n=197)								
αT/γT	<i>qαT/γT</i>	1	*	80.7–82.9	2.94	0.10	*	IN, USA
αT	<i>qαT</i>	1	*	100.2–104.2	4.45	0.39	*	IN, USA
γT3	<i>qγT3</i>	1	*	100.3–103.9	4.24	0.66	*	IN, USA
TT+TT3	<i>qTT+TT3</i>	1	*	99.7–105	2.84	0.10	*	IN, USA
δT3/γT3	<i>qδT3/γT3</i>	1	*	158.7–163.8	2.63	0.38	*	IN, USA
TT	<i>qTT</i>	2	*	33.3–38.5	3.03	3.74	*	IN, USA
αT3/γT3	<i>qαT3/γT3</i>	2	*	46.5–49.6	5.57	16.51	*	IN, USA
αT3/γT3	<i>qαT3/γT3</i>	2	*	55.7–59.2	2.84	2.41	*	IN, USA
αT3/γT3	<i>qαT3/γT3</i>	3	*	51.6–56.5	3.01	3.03	*	IN, USA
δT	<i>qδT</i>	3	*	62.5–65.6	6.27	8.26	*	IN, USA
δT(γT+αT)	<i>qδT(γT+αT)</i>	3	*	62.4–65.7	5.29	7.63	*	IN, USA
δT/γT	<i>qδT/γT</i>	3	*	63–65.6	5.67	5.71	*	IN, USA
δT/αT	<i>qδT/αT</i>	4	*	33.8–39	3.03	0.10	*	IN, USA
TT/TT3	<i>qTT/TT3</i>	5	*	35.7–37.3	3.53	9.94	*	IN, USA
δT3(γT3+αT3)	<i>qδT3(γT3+αT3)</i>	5	*	44.4–47.9	3.36	2.31	*	IN, USA
δT/γT	<i>qδT/γT</i>	5	*	47.2–51	9.63	18.53	<i>ZmVTE4</i>	IN, USA
αT/γT	<i>qαT/γT</i>	5	*	49.1–52.2	6.96	15.68	<i>ZmVTE4</i>	IN, USA
αT	<i>qαT</i>	5	*	49.4–58.8	2.92	2.99	*	IN, USA
δT/γT	<i>qδT/γT</i>	5	*	58.9–62.1	2.92	7.92	*	IN, USA
αT3/γT3	<i>qαT3/γT3</i>	5	*	69.4–74.3	3.86	6.43	<i>ZmVTE1</i>	IN, USA
δT3	<i>qδT3</i>	5	*	69.2–71.7	2.68	1.41	<i>ZmVTE1</i>	IN, USA
TT+TT3	<i>qTT+TT3</i>	5	*	72–78.4	7.63	9.74	*	IN, USA
δT	<i>qδT</i>	5	*	74–78.9	4.89	3.25	<i>ZmHPPD1</i>	IN, USA
TT3	<i>qTT3</i>	5	*	73.3–85.3	2.61	6.69	<i>ZmHPPD1</i>	IN, USA
αT3/γT3	<i>qαT3/γT3</i>	5	*	86.2–92.1	5.45	6.92	*	IN, USA
δT(γT+αT)	<i>qδT(γT+αT)</i>	5	*	105.9–109.6	3.36	4.35	*	IN, USA
γT	<i>qγT</i>	6	*	12.4–14.4	2.69	4.39	*	IN, USA
γT/(γT+αT)	<i>qγT/(γT+αT)</i>	6	*	12.4–14.4	2.69	4.39	*	IN, USA
γT3/(γT3+αT3)	<i>qγT3/(γT3+αT3)</i>	7	*	57.5–64.2	2.75	7.05	*	IN, USA
γT	<i>qγT</i>	7	*	57.1–64.2	2.58	5.63	*	IN, USA
TT3	<i>qTT3</i>	8	*	57.9–62.9	2.70	5.28	*	IN, USA
δT/αT	<i>qδT/αT</i>	8	*	57.8–66	2.52	2.45	*	IN, USA

$\alpha T/\gamma T$	$qaT/\gamma T$	9	*	50.4–56.5	3.99	15.26	*	IN, USA
$\delta T3/\gamma T3$	$q\delta T3/\gamma T3$	9	*	52.2–53.2	21.95	38.95	*	IN, USA
$TT+TT3$	$qTT+TT3$	9	*	54.9–55.8	18.48	26.87	*	IN, USA
$\delta T/\alpha T$	$q\delta T/\alpha T$	9	*	54.2–55.4	10.98	13.96	*	IN, USA
$\delta T3/\alpha T3$	$q\delta T3/\alpha T3$	9	*	53.5–58.8	7.91	13.52	*	IN, USA
$\alpha T/\gamma T$	$qaT/\gamma T$	9	*	54–57.6	13.04	22.98	*	IN, USA
δT	$q\delta T$	9	*	54.1–56.5	7.82	18.41	*	IN, USA
γT	$q\gamma T$	9	*	55.1–55.9	57.19	29.45	*	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	9	*	55.1–55.9	57.19	29.45	*	IN, USA
$\gamma T3/(\gamma T3+\alpha T3)$	$q\gamma T3/(\gamma T3+\alpha T3)$	9	*	55.5–57.8	12.65	39.15	*	IN, USA
$\delta T3(\gamma T3+\alpha T3)$	$q\delta T3(\gamma T3+\alpha T3)$	9	*	55.5–57.8	23.53	63.74	*	IN, USA
$\delta T3$	$q\delta T3$	9	*	56.5–60	42.26	74.09	<i>ZmHGGT1</i>	IN, USA
$\gamma T3$	$q\gamma T3$	9	*	56.5–60	36.46	65.11	<i>ZmHGGT1</i>	IN, USA
TT	qTT	9	*	56.5–58.8	13.02	21.44	*	IN, USA
$\alpha T3$	$qaT3$	9	*	56.5–61	2.81	6.32	<i>ZmHGGT1</i>	IN, USA
$TT3$	$qTT3$	9	*	56.7–58.8	10.34	24.43	*	IN, USA
$TT+TT3$	$qTT+TT3$	9	*	56.5–61	3.18	0.10	<i>ZmHGGT1</i>	IN, USA
$\alpha T3/\gamma T3$	$qaT3/\gamma T3$	9	*	59–60.3	62.60	29.63	<i>ZmHGGT1</i>	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	9	*	59–60.3	62.60	29.63	<i>ZmHGGT1</i>	IN, USA
$\gamma T3/(\gamma T3+\alpha T3)$	$q\gamma T3/(\gamma T3+\alpha T3)$	9	*	59–63	13.42	4.08	<i>ZmHGGT1</i>	IN, USA
$\delta T3/\gamma T3$	$q\delta T3/\gamma T3$	9	*	67.9–72	2.84	0.45	*	IN, USA
$\delta T3$	$q\delta T3$	9	*	71.5–73.2	6.80	5.43	*	IN, USA
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	9	*	99–104.4	2.98	1.33	*	IN, USA
$\delta T3/\gamma T3$	$q\delta T3/\gamma T3$	10	*	44.7–48.5	3.63	0.10	*	IN, USA
$\gamma T3/(\gamma T3+\alpha T3)$	$q\gamma T3/(\gamma T3+\alpha T3)$	10	*	52–55	3.42	2.85	*	IN, USA
$\alpha T3$	$qaT3$	10	*	51.6–56.1	2.99	3.01	*	IN, USA
QTL Identified in one or more of the 6 RIL populations								
AT	qAT	1	*	2.93–3.41	3.91	9.06	*	China
GT	qGT	1	*	6.95–10.06	3.85	7.48	<i>GRMZM2G112728</i>	China
TT	qTT	1	*	7.43–9.81	4.81	9.3	*	China
DT	qDT	1	*	6.25–11.39	3.58	6.23	*	China
GT	qGT	1	*	12.13–21.50	3.17	2.86	*	China
TT	qTT	1	*	22.38–46.68	3.49	3.6	<i>GRMZM2G164562</i>	China
GT	qGT	1	*	27.80–56.89	3.58	4.89	<i>GRMZM2G141273</i>	China
TT	qTT	1	*	30.20–58.46	4.85	6.92	*	China
AT	qAT	1	*	51.01–76.87	6.98	11.58	<i>GRMZM2G396212</i>	China
DT	qDT	1	*	84.63–142.37	3.75	6.53	<i>GRMZM2G359822</i>	China
DT	qDT	1	*	98.16–174.37	7.17	13.12	<i>GRMZM2G082998</i>	China
TT	qTT	1	*	213.57–234.79	3.52	6.6	*	China
DT	qDT	1	*	223.76–235.46	4.42	7.65	*	China
AT	qAT	1	*	224.38–230.83	7.28	8.91	*	China
GT	qGT	1	*	225.04–228.30	26.19	34.29	*	China
TT	qTT	1	*	226.14–228.72	24.98	36.34	*	China
RT	qRT	1	*	251.16–262.40	3.59	6.61	<i>GRMZM2G448446</i>	China
AT	qAT	1	*	253.09–273.45	4.48	8.27	<i>GRMZM2G027059</i>	China
RT	qRT	1	*	273.4–285.13	3.97	7.09	*	China
AT	qAT	1	*	286.51–292.13	3.65	7.63	<i>GRMZM2G156516</i>	China
AT	qAT	1	*	287.71–298.05	3.15	5.01	*	China
GT	qGT	2	*	30.19–69.18	3.26	4.16	<i>GRMZM2G437912</i>	China
GT	qGT	2	*	34.67–114.20	3.05	4	*	China
DT	qDT	2	*	77.70–181.42	3.22	6.7	<i>GRMZM2G466543</i>	China

(Wang et al., 2018)

AT	qAT	2	*	208.21-222.47	3.13	3.98	GRMZM2G113476	China
DT	qDT	2	*	203.15-222.30	4.81	8.59	AC194970.5 FG001	China
RT	qRT	2	*	212.54-218.46	8.29	15.8	*	China
GT	qGT	3	*	9.04-22.39	3.74	7.08	GRMZM2G056975	China
GT	qGT	3	*	22.00-48.81	4.25	6	GRMZM2G419111	China
AT	qAT	3	*	162.15-210.52	4.49	8.91	GRMZM5G856881	China
RT	qRT	3	*	220.40-227.70	3.03	4.48	*	China
RT	qRT	3	*	223.91-227.41	4.44	8.37	*	China
GT	qGT	4	*	2.86-5.83	5.62	7	GRMZM2G006480	China
AT	qAT	4	*	175.27-186.06	4.53	7.4	GRMZM2G161566	China
DT	qDT	4	*	181.23-189.61	4.18	8.9	*	China
GT	qGT	5	*	2.28-5.90	3.21	6.33	*	China
DT	qDT	5	*	15.14-25.39	4.42	9.4	GRMZM2G454719	China
GT	qGT	5	*	19.34-25.05	26.79	46.56	GRMZM2G084942	China
RT	qRT	5	*	19.67-25.39	7.41	12.05	GRMZM2G085117	China
TT	qTT	5	*	22.10-24.71	29.47	48.69	*	China
AT	qAT	5	*	22.10-24.71	13.56	19.99	*	China
RT	qRT	5	*	19.68-26.56	6.55	9.32	*	China
TT	qTT	5	*	18.67-43.42	7.83	11.44	*	China
GT	qGT	5	*	14.84-49.80	6.3	8.61	*	China
GT	qGT	5	*	20.49-29.99	11.92	19.11	*	China
TT	qTT	5	*	21.42-29.92	12.89	21.78	*	China
DT	qDT	5	*	18.54-51.43	3.1	6.47	*	China
DT	qDT	5	*	14.02-69.30	3.24	5.26	*	China
DT	qDT	5	*	63.32-81.27	5.77	10.87	GRMZM2G477236	China
GT	qGT	5	*	191.37-200.60	11.87	13.08	AC209374.4 FG002	China
RT	qRT	5	*	191.09-202.81	3.73	7.95	GRMZM2G035213	China
RT	qRT	5	*	197.70-205.02	3.91	7.26	GRMZM2G105644	China
RT	qRT	5	*	198.50-202.05	14.74	26.34	GRMZM2G070218	China
AT	qAT	5	*	196.68-208.76	3.46	6.92	*	China
RT	qRT	5	*	197.11-200.60	25.9	40.59	*	China
AT	qAT	5	*	196.18-202.16	9.55	13.16	*	China
RT	qRT	5	*	197.84-201.61	15.48	28.3	*	China
AT	qAT	5	*	197.11-200.60	22.44	35.07	*	China
GT	qGT	5	*	196.68-203.80	5.77	7.75	*	China
RT	qRT	5	*	211.94-216.50	3.04	4.63	*	China
RT	qRT	5	*	213.88-215.59	3.47	4.44	*	China
DT	qDT	6	*	16.17-89.91	3.6	6.32	GRMZM2G365961	China
DT	qDT	6	*	97.28-108.26	4.91	8.72	*	China
AT	qAT	6	*	133.05-150.40	3.85	8.69	GRMZM5G878070	China
TT	qTT	6	*	137.69-150.48	3.62	7.18	GRMZM2G137151	China
RT	qRT	7	*	5.56-9.70	3.66	6.94	*	China
DT	qDT	7	*	21.27-73.50	4.96	8.97	GRMZM2G374213	China
DT	qDT	7	*	86.32-92.94	4.44	8.16	*	China
TT	qTT	7	*	27.98-128.71	3.59	4.11	*	China
AT	qAT	7	*	123.67-136.86	3.84	7.82	GRMZM2G121546	China
RT	qRT	7	*	125.14-143.29	3.85	4.32	*	China
AT	qAT	7	*	130.90-155.37	3.25	3.62	*	China
DT	qDT	8	*	7.39-11.36	3.11	5.54	GRMZM2G058404	China
GT	qGT	8	*	6.14-10.09	7	9.65	GRMZM2G036290	China
TT	qTT	8	*	7.87-8.73	11.05	17.1	*	China
GT	qGT	8	*	10.00-13.69	3.08	4.26	*	China

AT	qAT	8	*	21.30-123.80	3.47	7.93	GRMZM2G315125	China
RT	qRT	8	*	118.86-150.15	3.7	4.11	*	China
DT	qDT	8	*	157.40-162.50	3.23	6.86	*	China
GT	qGT	8	*	162.50-168.93	4.66	8.94	GRMZM2G172032	China
TT	qTT	8	*	162.50-168.93	4.14	8.14	*	China
DT	qDT	8	*	165.35-168.24	6.92	12.68	*	China
AT	qAT	9	*	17.12-23.46	4.77	7.65	GRMZM2G173641	China
GT	qGT	9	*	129.19-141.78	4.67	6.65	GRMZM2G145451	China
TT	qTT	9	*	129.19-143.03	3.16	4.59	GRMZM2G036861	China
RT	qRT	10	*	10.19-80.40	3.76	6.75	GRMZM2G014376	China
AT	qAT	10	*	117.27-132.54	6.86	12.53	*	China
GT	qGT	10	*	127.35-136.01	6.79	10.42	*	China
TT	qTT	10	*	125.13-132.12	5.67	9.06	*	China
SNPs Identified by GWAS in the Association panel population								
AT	qAT-1	1	chr1.S_3038971	3,038,971	4.87E-07	*	GRMZM2G436226	China
	qAT-2	1	chr1.S_4040365	4,040,365	1.47E-06	*	GRMZM2G013634	China
	qAT-1	2	chr2.S_136272058	136,272,058	5.03E-07	*	GRMZM2G043226	China
	qAT-2	2	chr2.S_136272060	136,272,060	5.03E-07	*	GRMZM2G043226	China
	qAT-3	2	chr2.S_136272061	136,272,061	5.03E-07	*	GRMZM2G043226	China
	qAT-4	2	chr2.S_136272084	136,272,084	5.03E-07	*	GRMZM2G043226	China
	qAT-5	2	chr2.S_136272140	136,272,140	5.03E-07	*	GRMZM2G043226	China
	qAT-6	2	chr2.S_136272141	136,272,141	5.03E-07	*	GRMZM2G043226	China
	qAT-7	2	chr2.S_136272169	136,272,169	5.03E-07	*	GRMZM2G043226	China
	qAT-8	2	chr2.S_136272394	136,272,394	5.23E-07	*	GRMZM2G043226	China
	qAT-9	2	chr2.S_136272396	136,272,396	5.23E-07	*	GRMZM2G043226	China
	qAT-10	2	chr2.S_136272403	136,272,403	5.14E-07	*	GRMZM2G043226	China
	qAT-11	3	chr3.S_2139263	2,139,263	5.23E-07	*	GRMZM2G170013	China
	qAT-12	3	chr3.S_232043044	232,043,044	1.47E-06	*	GRMZM5G875655	China
	qAT-13	3	chr3.S_232043153	232,043,153	1.47E-06	*	GRMZM5G875655	China
	qAT-14	3	chr3.S_232043402	232,043,402	1.47E-06	*	GRMZM5G875655	China
	qAT-15	3	chr3.S_232044135	232,044,135	1.63E-06	*	GRMZM5G875655	China
	qAT-16	4	chr4.S_201887561	201,887,561	6.58E-07	*	GRMZM2G000608	China
	qAT-17	4	chr4.S_239794450	239,794,450	6.95E-07	*	GRMZM2G150251	China
	qAT-18	5	chr5.S_90530346	90,530,346	1.28E-06	*	GRMZM2G046155	China
	qAT-19	5	chr5.S_196508571	196,508,571	2.40E-07	*	GRMZM2G022645	China
	qAT-20	5	chr5.S_196510693	196,510,693	4.99E-07	*	GRMZM2G022645	China
	qAT-21	5	chr5.S_196511036	196,511,036	1.35E-08	*	GRMZM2G022645	China
	qAT-22	5	chr5.S_198879413	198,879,413	4.30E-07	*	GRMZM2G413829	China
	qAT-23	5	chr5.S_198879415	198,879,415	4.30E-07	*	GRMZM2G413829	China
	qAT-24	5	chr5.S_199371029	199,371,029	1.09E-08	*	GRMZM2G376067	China
	qAT-25	5	chr5.S_199373005	199,373,005	1.09E-08	*	GRMZM2G376067	China
	qAT-26	5	chr5.S_199373231	199,373,231	1.09E-08	*	GRMZM2G376067	China
	qAT-27	5	chr5.S_199373289	199,373,289	1.09E-08	*	GRMZM2G376067	China
	qAT-28	5	chr5.S_199373414	199,373,414	4.41E-09	*	GRMZM2G376067	China
	qAT-29	5	chr5.S_199377626	199,377,626	1.09E-08	*	GRMZM2G027741	China
	qAT-30	5	chr5.S_199378010	199,378,010	1.09E-08	*	GRMZM2G027741	China
	qAT-31	5	chr5.S_199379904	199,379,904	1.09E-08	*	GRMZM2G027741	China
	qAT-32	5	chr5.S_199380227	199,380,227	1.09E-08	*	GRMZM2G027741	China
	qAT-33	5	chr5.S_199380407	199,380,407	2.15E-09	*	GRMZM2G027741	China
	qAT-34	5	PZE-105146513	199,647,442	3.82E-11	*	GRMZM5G823157	China
	qAT-35	5	chr5.S_200114897	200,114,897	6.01E-09	*	GRMZM2G108996	China

qAT-36	5	chr5.S_200114905	200,114,905	1.84E-06	*	GRMZM2G108996	China
qAT-37	5	chr5.S_200114909	200,114,909	4.19E-07	*	GRMZM2G108996	China
qAT-38	5	chr5.S_200114947	200,114,947	2.25E-09	*	GRMZM2G108996	China
qAT-39	5	chr5.S_200114950	200,114,950	2.83E-10	*	GRMZM2G108996	China
qAT-40	5	chr5.S_200114951	200,114,951	2.83E-10	*	GRMZM2G108996	China
qAT-41	5	chr5.S_200114953	200,114,953	2.83E-10	*	GRMZM2G108996	China
qAT-42	5	chr5.S_200114954	200,114,954	2.83E-10	*	GRMZM2G108996	China
qAT-43	5	chr5.S_200294718	200,294,718	3.10E-10	*	GRMZM2G034876	China
qAT-44	5	chr5.S_200294736	200,294,736	3.89E-09	*	GRMZM2G034876	China
qAT-45	5	chr5.S_200294763	200,294,763	3.31E-07	*	GRMZM2G034876	China
qAT-46	5	PZE-105147666	200,300,836	6.81E-11	*	GRMZM2G034876	China
qAT-47	5	chr5.S_200367420	200,367,420	4.41E-21	*	GRMZM2G035213	China
qAT-48	5	PZB02283.1	200,367,532	2.55E-18	*	GRMZM2G035213	China
qAT-49	5	chr5.S_200369079	200,369,079	8.93E-17	*	GRMZM2G035213	China
qAT-50	5	PZE-105147738	200,369,124	1.86E-16	*	GRMZM2G035213	China
qAT-51	5	chr5.S_200369163	200,369,163	4.08E-22	*	GRMZM2G035213	China
qAT-52	5	chr5.S_200370009	200,370,009	5.03E-15	*	GRMZM2G035213	China
qAT-53	5	chr5.S_200370013	200,370,013	2.00E-13	*	GRMZM2G035213	China
qAT-54	5	chr5.S_200370675	200,370,675	6.78E-08	*	GRMZM2G035213	China
qAT-55	5	chr5.S_200370683	200,370,683	6.75E-13	*	GRMZM2G035213	China
qAT-56	5	chr5.S_200370743	200,370,743	5.92E-07	*	GRMZM2G035213	China
qAT-57	5	chr5.S_200370781	200,370,781	3.76E-15	*	GRMZM2G035213	China
qAT-58	5	chr5.S_200370782	200,370,782	8.65E-16	*	GRMZM2G035213	China
qAT-59	5	chr5.S_200380468	200,380,468	4.22E-07	*	GRMZM2G035213	China
qAT-60	5	chr5.S_200380534	200,380,534	8.09E-07	*	GRMZM2G035213	China
qAT-61	5	chr5.S_200380572	200,380,572	1.02E-15	*	GRMZM2G167431	China
qAT-62	5	chr5.S_200380573	200,380,573	2.94E-08	*	GRMZM2G167431	China
qAT-63	5	chr5.S_200380575	200,380,575	1.02E-15	*	GRMZM2G167431	China
qAT-64	5	chr5.S_200380576	200,380,576	2.96E-19	*	GRMZM2G167431	China
qAT-65	5	chr5.S_200380614	200,380,614	2.28E-09	*	GRMZM2G167431	China
qAT-66	5	chr5.S_200380699	200,380,699	1.44E-15	*	GRMZM2G167431	China
qAT-67	5	chr5.S_200380732	200,380,732	1.44E-15	*	GRMZM2G167431	China
qAT-68	5	chr5.S_200380825	200,380,825	1.21E-12	*	GRMZM2G167431	China
qAT-69	5	chr5.S_200381453	200,381,453	1.21E-12	*	GRMZM2G167431	China
qAT-70	5	chr5.S_200381475	200,381,475	1.21E-12	*	GRMZM2G167431	China
qAT-71	5	chr5.S_200382168	200,382,168	5.25E-13	*	GRMZM2G167431	China
qAT-72	5	chr5.S_200382301	200,382,301	2.55E-13	*	GRMZM2G167431	China
qAT-73	5	chr5.S_200382311	200,382,311	1.71E-06	*	GRMZM2G167431	China
qAT-74	5	chr5.S_200435108	200,435,108	1.39E-17	*	GRMZM2G325019	China
qAT-75	5	chr5.S_200435117	200,435,117	1.98E-08	*	GRMZM2G325019	China
qAT-76	5	PZE-105147471	200,435,300	2.11E-14	*	GRMZM2G325019	China
qAT-77	5	chr5.S_200436292	200,436,292	5.10E-21	*	GRMZM2G325019	China
qAT-78	5	chr5.S_200437084	200,437,084	9.09E-13	*	GRMZM2G325019	China
qAT-79	5	chr5.S_200437319	200,437,319	2.17E-09	*	GRMZM2G325019	China
qAT-80	5	chr5.S_200437366	200,437,366	9.99E-09	*	GRMZM2G325019	China
qAT-81	5	chr5.S_200437468	200,437,468	1.53E-10	*	GRMZM2G325019	China
qAT-82	5	chr5.S_200437599	200,437,599	4.64E-10	*	GRMZM2G325019	China
qAT-83	5	chr5.S_200437607	200,437,607	1.26E-09	*	GRMZM2G325019	China
qAT-84	5	chr5.S_200437642	200,437,642	5.67E-13	*	GRMZM2G325019	China
qAT-85	5	chr5.S_200437660	200,437,660	7.81E-08	*	GRMZM2G325019	China
qAT-86	5	chr5.S_200437708	200,437,708	1.46E-10	*	GRMZM2G325019	China
qAT-87	5	chr5.S_200437813	200,437,813	6.49E-07	*	GRMZM2G325019	China

<i>qAT-88</i>	5	chr5.S_200437879	200,437,879	5.60E-17	*	<i>GRMZM2G325019</i>	China
<i>qAT-89</i>	5	chr5.S_200437882	200,437,882	6.44E-09	*	<i>GRMZM2G325019</i>	China
<i>qAT-90</i>	5	chr5.S_200437909	200,437,909	6.44E-09	*	<i>GRMZM2G325019</i>	China
<i>qAT-91</i>	5	chr5.S_200438027	200,438,027	2.51E-15	*	<i>GRMZM2G325019</i>	China
<i>qAT-92</i>	5	chr5.S_200438197	200,438,197	3.35E-13	*	<i>GRMZM2G325019</i>	China
<i>qAT-93</i>	5	chr5.S_200438220	200,438,220	1.51E-09	*	<i>GRMZM2G325019</i>	China
<i>qAT-94</i>	5	chr5.S_200438234	200,438,234	5.21E-09	*	<i>GRMZM2G325019</i>	China
<i>qAT-95</i>	5	chr5.S_200438247	200,438,247	4.18E-07	*	<i>GRMZM2G325019</i>	China
<i>qAT-96</i>	5	chr5.S_200438314	200,438,314	3.50E-12	*	<i>GRMZM2G325019</i>	China
<i>qAT-97</i>	5	chr5.S_200438352	200,438,352	8.14E-12	*	<i>GRMZM2G325038</i>	China
<i>qAT-98</i>	5	chr5.S_200438462	200,438,462	5.80E-12	*	<i>GRMZM2G325038</i>	China
<i>qAT-99</i>	5	chr5.S_200438465	200,438,465	3.65E-12	*	<i>GRMZM2G325038</i>	China
<i>qAT-100</i>	5	chr5.S_200438466	200,438,466	3.65E-12	*	<i>GRMZM2G325038</i>	China
<i>qAT-101</i>	5	chr5.S_200438485	200,438,485	3.19E-09	*	<i>GRMZM2G325038</i>	China
<i>qAT-102</i>	5	chr5.S_200438560	200,438,560	1.80E-10	*	<i>GRMZM2G325038</i>	China
<i>qAT-103</i>	5	chr5.S_200438590	200,438,590	2.27E-11	*	<i>GRMZM2G325038</i>	China
<i>qAT-104</i>	5	chr5.S_200438694	200,438,694	1.24E-13	*	<i>GRMZM2G325038</i>	China
<i>qAT-105</i>	5	chr5.S_200438801	200,438,801	1.91E-07	*	<i>GRMZM2G325038</i>	China
<i>qAT-106</i>	5	chr5.S_200438905	200,438,905	6.38E-07	*	<i>GRMZM2G325038</i>	China
<i>qAT-107</i>	5	chr5.S_200528650	200,528,650	2.02E-07	*	<i>GRMZM2G108087</i>	China
<i>qAT-108</i>	5	chr5.S_200528660	200,528,660	2.02E-07	*	<i>GRMZM2G108087</i>	China
<i>qAT-109</i>	5	chr5.S_200528663	200,528,663	6.56E-07	*	<i>GRMZM2G108087</i>	China
<i>qAT-110</i>	5	chr5.S_200552005	200,552,005	7.18E-11	*	<i>GRMZM2G092749</i>	China
<i>qAT-111</i>	5	chr5.S_200552079	200,552,079	9.38E-09	*	<i>GRMZM2G092749</i>	China
<i>qAT-112</i>	5	chr5.S_200684527	200,684,527	4.82E-10	*	<i>GRMZM2G150374</i>	China
<i>qAT-113</i>	5	chr5.S_200684528	200,684,528	4.82E-10	*	<i>GRMZM2G150374</i>	China
<i>qAT-114</i>	5	chr5.S_200684529	200,684,529	4.82E-10	*	<i>GRMZM2G150374</i>	China
<i>qAT-115</i>	5	chr5.S_200684530	200,684,530	4.82E-10	*	<i>GRMZM2G150374</i>	China
<i>qAT-116</i>	5	chr5.S_200686561	200,686,561	4.40E-10	*	<i>GRMZM2G150374</i>	China
<i>qAT-117</i>	5	chr5.S_200822060	200,822,060	2.44E-08	*	<i>GRMZM2G046748</i>	China
<i>qAT-118</i>	5	chr5.S_200824912	200,824,912	8.22E-09	*	<i>GRMZM2G046748</i>	China
<i>qAT-119</i>	5	PUT-163a-148963345-597	200,824,929	1.18E-06	*	<i>GRMZM2G046748</i>	China
<i>qAT-120</i>	5	SYN5678	200,871,732	1.17E-08	*	<i>GRMZM2G347767</i>	China
<i>qAT-121</i>	5	PZE-105148878	200,877,505	1.59E-07	*	<i>GRMZM2G046244</i>	China
<i>qAT-122</i>	5	chr5.S_200878876	200,878,876	3.30E-10	*	<i>GRMZM2G046244</i>	China
<i>qAT-123</i>	5	chr5.S_200878917	200,878,917	4.57E-10	*	<i>GRMZM2G046244</i>	China
<i>qAT-124</i>	5	chr5.S_200878929	200,878,929	1.05E-09	*	<i>GRMZM2G046244</i>	China
<i>qAT-125</i>	5	chr5.S_201072279	201,072,279	1.00E-06	*	<i>GRMZM2G050734</i>	China
<i>qAT-126</i>	5	chr5.S_201073030	201,073,030	1.58E-06	*	<i>GRMZM2G050734</i>	China
<i>qAT-127</i>	5	chr5.S_201226344	201,226,344	1.95E-07	*	<i>GRMZM2G417229</i>	China
<i>qAT-128</i>	5	chr5.S_201267187	201,267,187	6.67E-09	*	<i>GRMZM2G320307</i>	China
<i>qAT-129</i>	5	chr5.S_201403633	201,403,633	6.96E-07	*	<i>GRMZM2G140739</i>	China
<i>qAT-130</i>	5	chr5.S_201471104	201,471,104	1.04E-06	*	<i>GRMZM2G147377</i>	China
<i>qAT-131</i>	5	chr5.S_201938646	201,938,646	9.39E-10	*	<i>GRMZM2G009506</i>	China
<i>qAT-132</i>	5	chr5.S_202054574	202,054,574	5.94E-08	*	<i>GRMZM2G020040</i>	China
<i>qAT-133</i>	5	chr5.S_202058856	202,058,856	4.37E-08	*	<i>GRMZM2G020040</i>	China
<i>qAT-134</i>	5	chr5.S_202059377	202,059,377	5.94E-08	*	<i>GRMZM2G020040</i>	China
<i>qAT-135</i>	5	SYN35167	202,061,590	7.65E-08	*	<i>GRMZM2G315127</i>	China
<i>qAT-136</i>	5	chr5.S_202063233	202,063,233	5.79E-08	*	<i>GRMZM2G315127</i>	China
<i>qAT-137</i>	5	SYN35165	202,065,247	4.30E-07	*	<i>GRMZM2G315127</i>	China
<i>qAT-138</i>	5	chr5.S_202084979	202,084,979	3.49E-08	*	<i>GRMZM2G180983</i>	China
<i>qAT-139</i>	5	chr5.S_202085266	202,085,266	5.78E-08	*	<i>GRMZM2G180983</i>	China

GT	<i>qAT-140</i>	5	SYN35180	202,085,442	1.27E-07	*	<i>GRMZM2G180983</i>	China
	<i>qAT-141</i>	5	SYN35179	202,085,459	8.76E-08	*	<i>GRMZM2G180983</i>	China
	<i>qAT-142</i>	5	chr5.S_202095425	202,095,425	6.34E-08	*	<i>GRMZM2G481605</i>	China
	<i>qAT-143</i>	5	chr5.S_202221152	202,221,152	3.91E-07	*	<i>GRMZM2G475349</i>	China
	<i>qAT-144</i>	5	chr5.S_202286259	202,286,259	1.94E-07	*	<i>GRMZM2G164912</i>	China
	<i>qAT-145</i>	5	chr5.S_202286260	202,286,260	1.94E-07	*	<i>GRMZM2G164912</i>	China
	<i>qAT-146</i>	5	chr5.S_202286261	202,286,261	7.21E-07	*	<i>GRMZM2G164912</i>	China
	<i>qAT-147</i>	5	chr5.S_202287726	202,287,726	2.18E-07	*	<i>GRMZM2G164912</i>	China
	<i>qAT-148</i>	5	chr5.S_213281088	213,281,088	1.17E-06	*	<i>GRMZM2G018484</i>	China
	<i>qAT-149</i>	5	chr5.S_213281249	213,281,249	2.22E-07	*	<i>GRMZM2G018484</i>	China
	<i>qAT-150</i>	5	chr5.S_213282225	213,282,225	4.01E-08	*	<i>GRMZM2G018103</i>	China
	<i>qAT-151</i>	5	chr5.S_213282760	213,282,760	4.27E-08	*	<i>GRMZM2G018103</i>	China
	<i>qGT-1</i>	1	chr1.S_228564342	228,564,342	1.04E-07	*	<i>GRMZM5G888696</i>	China
	<i>qGT-2</i>	1	chr1.S_228564433	228,564,433	1.04E-07	*	<i>GRMZM5G888696</i>	China
	<i>qGT-3</i>	1	chr1.S_228564475	228,564,475	1.04E-07	*	<i>GRMZM5G888696</i>	China
	<i>qGT-4</i>	1	chr1.S_228564518	228,564,518	1.04E-07	*	<i>GRMZM5G888696</i>	China
	<i>qGT-5</i>	1	chr1.S_228564574	228,564,574	7.31E-08	*	<i>GRMZM5G888696</i>	China
	<i>qGT-6</i>	1	PZE-101183878	228,564,617	2.20E-07	*	<i>GRMZM5G888696</i>	China
	<i>qGT-7</i>	5	chr5.S_175728543	175,728,543	3.33E-07	*	<i>GRMZM2G024739</i>	China
	<i>qGT-8</i>	6	chr6.S_92311076	92,311,076	1.19E-06	*	<i>GRMZM2G146190</i>	China
	<i>qGT-9</i>	6	chr6.S_92311381	92,311,381	1.19E-06	*	<i>GRMZM2G146190</i>	China
	<i>qGT-10</i>	6	chr6.S_92311403	92,311,403	1.19E-06	*	<i>GRMZM2G146190</i>	China
	<i>qGT-11</i>	6	chr6.S_92311428	92,311,428	1.19E-06	*	<i>GRMZM2G146190</i>	China
	<i>qGT-12</i>	6	chr6.S_92311455	92,311,455	1.19E-06	*	<i>GRMZM2G146190</i>	China
	<i>qGT-13</i>	6	chr6.S_92311522	92,311,522	1.19E-06	*	<i>GRMZM2G146190</i>	China
	<i>qGT-14</i>	6	chr6.S_92311686	92,311,686	1.19E-06	*	<i>GRMZM2G146190</i>	China
TT	<i>qGT-15</i>	6	chr6.S_104858461	104,858,461	6.75E-08	*	<i>GRMZM2G169089</i>	China
	<i>qGT-16</i>	6	chr6.S_104858493	104,858,493	2.21E-08	*	<i>GRMZM2G169089</i>	China
	<i>qGT-17</i>	8	chr8.S_38490100	38,490,100	3.66E-07	*	<i>GRMZM2G097103</i>	China
	<i>qTT-1</i>	1	PZE-101132612	170,961,674	1.16E-06	*	<i>GRMZM2G115615</i>	China
	<i>qTT-2</i>	2	chr2.S_149186669	149,186,669	6.06E-08	*	<i>GRMZM2G175008</i>	China
	<i>qTT-3</i>	2	chr2.S_149187319	149,187,319	3.29E-07	*	<i>GRMZM2G175008</i>	China
	<i>qTT-4</i>	2	chr2.S_149204826	149,204,826	5.88E-07	*	<i>GRMZM5G816552</i>	China
	<i>qTT-5</i>	2	chr2.S_149204828	149,204,828	5.88E-07	*	<i>GRMZM5G816552</i>	China
	<i>qTT-6</i>	2	chr2.S_149514761	149,514,761	1.32E-07	*	<i>GRMZM2G079127</i>	China
	<i>qTT-7</i>	2	chr2.S_149515487	149,515,487	3.42E-08	*	<i>GRMZM2G079127</i>	China
	<i>qTT-8</i>	2	chr2.S_149520851	149,520,851	3.09E-09	*	<i>GRMZM2G079236</i>	China
	<i>qTT-9</i>	2	chr2.S_149522783	149,522,783	3.09E-09	*	<i>GRMZM2G079236</i>	China
	<i>qTT-10</i>	2	chr2.S_149522937	149,522,937	3.09E-09	*	<i>GRMZM2G079236</i>	China
	<i>qTT-11</i>	2	chr2.S_149522941	149,522,941	3.09E-09	*	<i>GRMZM2G079236</i>	China
	<i>qTT-12</i>	2	chr2.S_149522977	149,522,977	3.09E-09	*	<i>GRMZM2G079236</i>	China
	<i>qTT-13</i>	2	chr2.S_149785952	149,785,952	3.65E-09	*	<i>GRMZM2G377797</i>	China
	<i>qTT-14</i>	2	chr2.S_150700155	150,700,155	1.11E-07	*	<i>GRMZM2G007283</i>	China
	<i>qTT-15</i>	2	chr2.S_150700305	150,700,305	4.77E-09	*	<i>GRMZM2G007283</i>	China
	<i>qTT-16</i>	2	chr2.S_150702210	150,702,210	7.20E-09	*	<i>GRMZM2G007283</i>	China
	<i>qTT-17</i>	2	chr2.S_150703980	150,703,980	7.38E-09	*	<i>GRMZM2G007283</i>	China
	<i>qTT-18</i>	2	chr2.S_150704064	150,704,064	7.38E-09	*	<i>GRMZM2G007283</i>	China
	<i>qTT-19</i>	2	chr2.S_150704088	150,704,088	7.38E-09	*	<i>GRMZM2G007283</i>	China
	<i>qTT-20</i>	2	chr2.S_207378625	207,378,625	1.90E-09	*	<i>GRMZM2G022213</i>	China
	<i>qTT-21</i>	2	chr2.S_207378663	207,378,663	1.90E-09	*	<i>GRMZM2G022213</i>	China
	<i>qTT-22</i>	2	chr2.S_207380989	207,380,989	7.97E-08	*	<i>GRMZM2G022213</i>	China
	<i>qTT-23</i>	3	chr3.S_2218034	2,218,034	1.87E-07	*	<i>GRMZM2G159307</i>	China

RT

qTT-24	3	chr3.S_2218607	2,218,607	6.77E-07	*	GRMZM2G159307	China
qTT-25	3	chr3.S_2220756	2,220,756	1.87E-07	*	GRMZM2G159388	China
qTT-26	4	chr4.S_18686833	18,686,833	1.65E-07	*	GRMZM5G892742	China
qTT-27	4	chr4.S_18686834	18,686,834	1.65E-07	*	GRMZM5G892742	China
qTT-28	4	PZE-104028481	34,338,513	8.34E-07	*	GRMZM2G000481	China
qTT-29	4	chr4.S_34338552	34,338,552	1.60E-06	*	GRMZM2G000481	China
qTT-30	4	chr4.S_34467924	34,467,924	1.60E-06	*	GRMZM2G157306	China
qTT-31	4	chr4.S_34473783	34,473,783	1.60E-06	*	GRMZM2G157306	China
qTT-32	4	chr4.S_151748204	151,748,204	8.20E-07	*	GRMZM2G150714	China
qTT-33	5	chr5.S_6803634	6,803,634	1.09E-06	*	GRMZM2G086287	China
qTT-34	5	chr5.S_6803876	6,803,876	1.06E-06	*	GRMZM2G086287	China
qTT-35	5	chr5.S_6803903	6,803,903	1.06E-06	*	GRMZM2G086287	China
qTT-36	5	chr5.S_6803934	6,803,934	1.09E-06	*	GRMZM2G086287	China
qTT-37	5	chr5.S_6804176	6,804,176	1.09E-06	*	GRMZM2G086287	China
qTT-38	5	chr5.S_6804312	6,804,312	1.09E-06	*	GRMZM2G086287	China
qTT-39	5	chr5.S_6804406	6,804,406	1.09E-06	*	GRMZM2G086287	China
qTT-40	5	chr5.S_6805126	6,805,126	1.09E-06	*	GRMZM2G086287	China
qTT-41	5	chr5.S_6805234	6,805,234	1.09E-06	*	GRMZM2G086287	China
qTT-42	5	chr5.S_6805341	6,805,341	1.09E-06	*	GRMZM2G086287	China
qTT-43	5	chr5.S_6805362	6,805,362	1.09E-06	*	GRMZM2G086287	China
qTT-44	5	chr5.S_6805384	6,805,384	1.09E-06	*	GRMZM2G086287	China
qTT-45	5	chr5.S_6805416	6,805,416	1.09E-06	*	GRMZM2G086287	China
qTT-46	5	chr5.S_6805480	6,805,480	1.09E-06	*	GRMZM2G086287	China
qTT-47	5	chr5.S_6805760	6,805,760	9.49E-07	*	GRMZM2G086287	China
qTT-48	5	chr5.S_6806066	6,806,066	9.49E-07	*	GRMZM2G086287	China
qTT-49	5	chr5.S_6806090	6,806,090	9.49E-07	*	GRMZM2G086287	China
qTT-50	5	chr5.S_6806177	6,806,177	1.23E-06	*	GRMZM2G086287	China
qTT-51	5	chr5.S_6806219	6,806,219	9.49E-07	*	GRMZM2G086287	China
qTT-52	5	chr5.S_20773412	20,773,412	7.12E-07	*	GRMZM2G002874	China
qTT-53	5	chr5.S_26095529	26,095,529	2.40E-07	*	GRMZM2G022175	China
qTT-54	5	chr5.S_26095624	26,095,624	2.40E-07	*	GRMZM2G022175	China
qTT-55	5	chr5.S_188606921	188,606,921	1.28E-06	*	GRMZM2G139858	China
qTT-56	6	chr6.S_104858404	104,858,404	4.02E-08	*	GRMZM2G169089	China
qTT-57	8	chr8.S_8399315	8,399,315	1.46E-08	*	GRMZM2G066057	China
qTT-58	8	chr8.S_23889464	23,889,464	1.08E-06	*	GRMZM2G099483	China
qTT-59	8	chr8.S_38520871	38,520,871	1.36E-08	*	GRMZM2G003022	China
qTT-60	10	PZE-110061746	116,894,888	5.61E-07	*	GRMZM2G054632	China
qTT-61	10	PZE-110062783	117,774,209	1.05E-06	*	GRMZM2G009888	China
qRT-1	2	chr2.S_5424718	5,424,718	5.95E-07	*	GRMZM2G055752	China
qRT-2	4	chr4.S_54553527	54,553,527	1.71E-06	*	GRMZM2G121776	China
qRT-3	4	chr4.S_136059154	136,059,154	1.42E-06	*	GRMZM2G067417	China
qRT-4	5	chr5.S_1936	1,936	4.87E-08	*	GRMZM2G356204	China
qRT-5	5	chr5.S_108368	108,368	2.97E-08	*	GRMZM2G089498	China
qRT-6	5	chr5.S_108369	108,369	2.97E-08	*	GRMZM2G089498	China
qRT-7	5	chr5.S_109095	109,095	7.78E-08	*	GRMZM2G089498	China
qRT-8	5	chr5.S_2582651	2,582,651	1.67E-06	*	GRMZM2G110952	China
qRT-9	5	chr5.S_2582687	2,582,687	1.67E-06	*	GRMZM2G110952	China
qRT-10	5	chr5.S_196508766	196,508,766	6.50E-08	*	GRMZM2G022645	China
qRT-11	5	chr5.S_196511108	196,511,108	7.03E-07	*	GRMZM2G022645	China
qRT-12	5	chr5.S_199862910	199,862,910	1.70E-08	*	GRMZM2G021270	China
qRT-13	5	chr5.S_199871369	199,871,369	2.80E-12	*	GRMZM2G317738	China
qRT-14	5	chr5.S_199984630	199,984,630	2.09E-11	*	AC233960.1_FG002	China

	<i>qRT-15</i>	5	PZE-105147361	200,115,761	7.65E-07	*	<i>GRMZM2G108996</i>	China	
	<i>qRT-16</i>	5	chr5.S_200292540	200,292,540	1.87E-07	*	<i>GRMZM2G034876</i>	China	
	<i>qRT-17</i>	5	chr5.S_200292661	200,292,661	2.49E-07	*	<i>GRMZM2G034876</i>	China	
	<i>qRT-18</i>	5	chr5.S_200293660	200,293,660	2.58E-08	*	<i>GRMZM2G034876</i>	China	
	<i>qRT-19</i>	5	chr5.S_200293667	200,293,667	3.64E-08	*	<i>GRMZM2G034876</i>	China	
	<i>qRT-20</i>	5	chr5.S_200293668	200,293,668	2.67E-08	*	<i>GRMZM2G034876</i>	China	
	<i>qRT-21</i>	5	chr5.S_200293669	200,293,669	2.67E-08	*	<i>GRMZM2G034876</i>	China	
	<i>qRT-22</i>	5	chr5.S_200293670	200,293,670	2.67E-08	*	<i>GRMZM2G034876</i>	China	
	<i>qRT-23</i>	5	chr5.S_200293693	200,293,693	7.60E-09	*	<i>GRMZM2G034876</i>	China	
	<i>qRT-24</i>	5	PZE-105147766	200,370,065	4.98E-10	*	<i>GRMZM2G035213</i>	China	
	<i>qRT-25</i>	5	chr5.S_200437162	200,437,162	6.90E-10	*	<i>GRMZM2G325019</i>	China	
	<i>qRT-26</i>	5	chr5.S_200438572	200,438,572	9.69E-10	*	<i>GRMZM2G325038</i>	China	
	<i>qRT-27</i>	5	chr5.S_200438920	200,438,920	3.89E-07	*	<i>GRMZM2G325038</i>	China	
	<i>qRT-28</i>	5	chr5.S_200481780	200,481,780	6.74E-08	*	<i>GRMZM2G092959</i>	China	
	<i>qRT-29</i>	5	chr5.S_200527129	200,527,129	7.51E-07	*	<i>GRMZM2G108087</i>	China	
	<i>qRT-30</i>	5	chr5.S_200527135	200,527,135	7.51E-07	*	<i>GRMZM2G108087</i>	China	
	<i>qRT-31</i>	5	chr5.S_200527246	200,527,246	6.41E-07	*	<i>GRMZM2G108087</i>	China	
	<i>qRT-32</i>	5	chr5.S_200528699	200,528,699	1.15E-07	*	<i>GRMZM2G108087</i>	China	
	<i>qRT-33</i>	5	chr5.S_200552153	200,552,153	2.64E-08	*	<i>GRMZM2G092749</i>	China	
	<i>qRT-34</i>	5	chr5.S_200552162	200,552,162	2.64E-08	*	<i>GRMZM2G092749</i>	China	
	<i>qRT-35</i>	5	chr5.S_200778988	200,778,988	1.26E-06	*	<i>GRMZM2G046909</i>	China	
	<i>qRT-36</i>	5	chr5.S_200779131	200,779,131	1.51E-06	*	<i>GRMZM2G046909</i>	China	
	<i>qRT-37</i>	5	SYN32527	202,132,225	1.40E-06	*	<i>GRMZM2G341957</i>	China	
	<i>qRT-38</i>	5	chr5.S_212093838	212,093,838	6.04E-07	*	<i>GRMZM2G039683</i>	China	
	<i>qRT-39</i>	6	chr6.S_7137764	7,137,764	8.17E-07	*	<i>GRMZM2G127299</i>	China	
	<i>qRT-40</i>	9	chr9.S_141452577	141,452,577	5.43E-07	*	<i>GRMZM5G818232</i>	China	
	<i>qRT-41</i>	10	chr10.S_4694476	4,694,476	2.62E-07	*	<i>GRMZM2G004534</i>	China	
	<i>qRT-42</i>	10	chr10.S_4695464	4,695,464	1.21E-07	*	<i>GRMZM2G004534</i>	China	
	<i>qRT-43</i>	10	chr10.S_4695681	4,695,681	3.70E-07	*	<i>GRMZM2G004534</i>	China	
	<i>qRT-44</i>	10	chr10.S_4695862	4,695,862	1.25E-06	*	<i>GRMZM2G004534</i>	China	
	<i>qRT-45</i>	10	chr10.S_4696252	4,696,252	1.75E-06	*	<i>GRMZM2G004534</i>	China	
	<i>qRT-46</i>	10	chr10.S_10600038	10,600,038	2.17E-07	*	<i>GRMZM2G402493</i>	China	
	<i>qRT-47</i>	10	chr10.S_10600039	10,600,039	2.17E-07	*	<i>GRMZM2G402493</i>	China	
	<i>qRT-48</i>	10	chr10.S_10600040	10,600,040	2.17E-07	*	<i>GRMZM2G402493</i>	China	
	<i>qRT-49</i>	10	chr10.S_136945275	136,945,275	1.76E-06	*	<i>AC235534.1_FG001</i>	China	
	<i>qRT-50</i>	10	chr10.S_140994710	140,994,710	6.19E-08	*	<i>GRMZM2G109753</i>	China	
	<i>qRT-51</i>	10	chr10.S_140994750	140,994,750	6.19E-08	*	<i>GRMZM2G109753</i>	China	
AT	<i>qAT-1</i>	1	chr1_88972694	88972694	2.06E-06	0.1542	<i>GRMZM2G089291</i>	China	(Xiao et al., 2020)
	<i>qAT-2</i>	2	chr2_99655269	99655269	1.98E-06	0.1602	<i>AC196212.3_FG001</i>	China	
	<i>qAT-3</i>	5	chr5_199221258	199221258	1.74E-07	0.2062	<i>GRMZM2G141975</i>	China	
	<i>qAT-4</i>	5	chr5_199340929	199340929	3.71E-08	0.2623	<i>GRMZM2G060834</i>	China	
	<i>qAT-5</i>	5	chr5_199422724	199422724	7.76E-08	0.2447	<i>GRMZM2G376067</i>	China	
	<i>qAT-6</i>	5	chr5_200376352	200376352	8.33E-10	0.3215	<i>GRMZM2G035213</i>	China	
	<i>qAT-7</i>	6	chr6_24552456	24552456	3.42E-06	0.1521	<i>GRMZM2G111579</i>	China	
	<i>qAT-8</i>	6	chr6_51279284	51279284	7.99E-07	0.1588	<i>GRMZM2G000707</i>	China	
BT	<i>qAT-9</i>	6	chr6_119248607	119248607	1.61E-06	0.1505	<i>GRMZM2G104511</i>	China	
	<i>qBT-1</i>	1	chr1_21361394	21361394	4.64E-08	0.2348	<i>GRMZM5G896834</i>	China	
	<i>qBT-2</i>	1	chr1_27801286	27801286	3.16E-06	0.1704	<i>GRMZM2G040121</i>	China	
	<i>qBT-3</i>	1	chr1_58731650	58731650	1.88E-06	0.1517	<i>GRMZM2G097843</i>	China	
	<i>qBT-4</i>	1	chr1_83332454	83332454	3.85E-07	0.1951	<i>GRMZM2G099467</i>	China	
	<i>qBT-5</i>	1	chr1_88972694	88972694	1.88E-08	0.2117	<i>GRMZM2G089291</i>	China	

DT RT	qBT-6	1	chr1_96013126	96013126	2.23E-06	0.1754	GRMZM2G042538	China
	qBT-7	2	chr2_137684715	137684715	4.53E-06	0.1544	No	China
	qBT-8	3	chr3_131370095	131370095	6.56E-07	0.1685	GRMZM2G447657	China
	qBT-9	3	chr3_204172506	204172506	5.66E-06	0.2048	GRMZM2G330298	China
	qBT-10	3	chr3_228566338	228566338	4.51E-06	0.1418	AC185276.2_FG006	China
	qBT-11	4	chr4_7038838	7038838	9.11E-08	0.2292	GRMZM2G702335	China
	qBT-12	5	chr5_3322754	3322754	4.01E-08	0.2247	AC210013.4_FG005	China
	qBT-13	5	chr5_66308848	66308848	5.76E-08	0.1949	GRMZM2G006282	China
	qBT-14	5	chr5_193510153	193510153	1.12E-06	0.2219	GRMZM2G362848	China
	qBT-15	5	chr5_199221258	199221258	5.03E-10	0.2834	GRMZM2G141975	China
	qBT-16	5	chr5_199340929	199340929	5.11E-08	0.2103	GRMZM2G060834	China
	qBT-17	6	chr6_9685268	9685268	1.49E-06	0.1664	GRMZM2G055238	China
	qBT-18	6	chr6_20381982	20381982	4.78E-06	0.1521	No	China
	qBT-19	6	chr6_24552456	24552456	1.36E-06	0.1594	GRMZM2G111579	China
	qBT-20	6	chr6_67456686	67456686	4.55E-06	0.1424	GRMZM2G137440	China
	qBT-21	6	chr6_72442017	72442017	6.07E-06	0.1384	AC194478.3_FG005	China
	qBT-22	6	chr6_73214934	73214934	3.82E-06	0.1414	No	China
	qBT-23	6	chr6_82489783	82489783	4.85E-06	0.1428	GRMZM2G150348	China
	qBT-24	6	chr6_113453200	113453200	1.76E-07	0.2042	GRMZM2G020742	China
	qBT-25	6	chr6_117903333	117903333	4.56E-06	0.1452	GRMZM2G435357	China
	qBT-26	6	chr6_119248607	119248607	6.38E-06	0.1358	GRMZM2G104511	China
	qBT-27	7	chr7_105008316	105008316	5.42E-06	0.1371	GRMZM2G150832	China
	qBT-28	7	chr7_161885914	161885914	1.45E-06	0.1628	GRMZM2G411916	China
	qBT-29	9	chr9_4311642	4311642	5.03E-06	0.139	GRMZM2G465046	China
	qBT-30	9	chr9_94675466	94675466	1.16E-07	0.2044	No	China
	qBT-31	9	chr9_123234213	123234213	5.63E-06	0.1424	GRMZM2G057865	China
	qBT-32	9	chr9_126210698	126210698	4.53E-07	0.177	AC207309.3_FG010	China
	qDT-1	4	chr4_169577228	169577228	1.41E-06	0.1626	GRMZM2G123818	China
	qRT-1	1	chr1_80813652	80813652	6.42E-06	0.1321	GRMZM2G049852	China
	qRT-2	1	chr1_88972694	88972694	1.89E-07	0.1809	GRMZM2G089291	China
	qRT-3	2	chr2_101807859	101807859	5.75E-06	0.1385	GRMZM5G878497	China
	qRT-4	5	chr5_199221258	199221258	2.64E-07	0.1913	GRMZM2G141975	China
	qRT-5	5	chr5_199422724	199422724	8.82E-08	0.2346	GRMZM2G376067	China
	qRT-6	5	chr5_200376352	200376352	3.00E-10	0.3098	GRMZM2G035213	China
	qRT-7	9	chr9_14027435	14027435	1.87E-07	0.1999	GRMZM2G149126	China
	qRT-8	9	chr9_50743440	50743440	6.35E-06	0.1573	GRMZM2G408256	China
	qRT-9	9	chr9_58232718	58232718	1.45E-06	0.1759	GRMZM2G076272	China
	qRT-10	9	chr9_59379168	59379168	4.86E-06	0.1367	GRMZM2G005664	China
	qRT-11	9	chr9_60230402	60230402	3.74E-06	0.1553	GRMZM2G104481	China
	qRT-12	9	chr9_92205956	92205956	6.65E-06	0.1439	GRMZM2G076526	China
	qRT-13	9	chr9_98638085	98638085	4.54E-07	0.1625	GRMZM2G177659	China
TT	qTT-1	2	chr2_99655269	99655269	3.24E-06	0.1587	AC196212.3_FG001	China
	qTT-2	5	chr5_199340929	199340929	2.95E-07	0.2133	GRMZM2G060834	China
	qTT-3	6	chr6_24552456	24552456	7.25E-07	0.1768	GRMZM2G111579	China
	qTT-4	6	chr6_51279284	51279284	4.41E-06	0.1421	GRMZM2G000707	China
AT3	qAT3-1	4	chr4_179282037	179282037	2.70E-06	0.1472	GRMZM5G848268	China
	qAT3-2	5	chr5_199422724	199422724	4.11E-07	0.228	GRMZM2G376067	China
	qAT3-3	5	chr5_200376352	200376352	5.03E-10	0.3032	GRMZM2G035213	China
RT3	qRT3-1	1	chr1_15966886	15966886	5.33E-06	0.1877	GRMZM2G156486	China
	qRT3-2	1	chr1_29073536	29073536	2.77E-06	0.1548	GRMZM2G447504	China
	qRT3-3	1	chr1_86530409	86530409	3.78E-06	0.1675	GRMZM2G017011	China
	qRT3-4	1	chr1_89170681	89170681	9.22E-08	0.2201	AC204552.3_FG001	China

qRT3-5	1	chr1_118638363	118638363	4.26E-06	0.1405	No	China
qRT3-6	1	chr1_124668839	124668839	5.36E-06	0.145	GRMZM2G359822	China
qRT3-7	1	chr1_132598690	132598690	6.62E-07	0.1642	GRMZM2G170839	China
qRT3-8	1	chr1_151897716	151897716	3.39E-06	0.1523	No	China
qRT3-9	1	chr1_209701182	209701182	2.10E-06	0.149	GRMZM5G825854	China
qRT3-10	1	chr1_211870007	211870007	1.20E-06	0.1591	GRMZM2G043819	China
qRT3-11	1	chr1_214620377	214620377	1.51E-07	0.1923	GRMZM2G536825	China
qRT3-12	1	chr1_269769913	269769913	5.46E-06	0.1551	GRMZM2G077147	China
qRT3-13	1	chr1_294952643	294952643	3.49E-06	0.1432	GRMZM2G123876	China
qRT3-14	2	chr2_1320971	1320971	2.36E-06	0.1581	GRMZM2G147854	China
qRT3-15	2	chr2_58478180	58478180	1.35E-06	0.1564	GRMZM2G062504	China
qRT3-16	2	chr2_143586615	143586615	5.67E-06	0.1496	GRMZM2G168829	China
qRT3-17	2	chr2_147917250	147917250	4.05E-07	0.1711	GRMZM2G424491	China
qRT3-18	2	chr2_179437626	179437626	4.23E-06	0.1407	GRMZM2G703265	China
qRT3-19	2	chr2_213974400	213974400	3.87E-06	0.146	GRMZM2G354013	China
qRT3-20	2	chr2_222865364	222865364	2.69E-06	0.1695	GRMZM2G154716	China
qRT3-21	2	chr2_229961991	229961991	1.58E-06	0.154	GRMZM2G333448	China
qRT3-22	3	chr3_54193516	54193516	5.28E-06	0.1451	GRMZM5G830319	China
qRT3-23	3	chr3_57167369	57167369	5.12E-06	0.1436	GRMZM2G016754	China
qRT3-24	3	chr3_81038099	81038099	1.87E-06	0.1504	GRMZM2G156033	China
qRT3-25	3	chr3_101087707	101087707	3.04E-06	0.1467	GRMZM2G401179	China
qRT3-26	3	chr3_113948740	113948740	6.40E-06	0.1504	AC230011.2_FG002	China
qRT3-27	3	chr3_197797519	197797519	3.92E-06	0.1414	GRMZM2G043212	China
qRT3-28	3	chr3_198303954	198303954	2.89E-06	0.1478	GRMZM2G141299	China
qRT3-29	3	chr3_210354275	210354275	7.81E-07	0.1802	GRMZM2G437460	China
qRT3-30	3	chr3_224713856	224713856	4.18E-06	0.1413	GRMZM2G034684	China
qRT3-31	4	chr4_2969678	2969678	2.91E-06	0.1758	GRMZM2G469483	China
qRT3-32	4	chr4_11223788	11223788	3.32E-07	0.2017	GRMZM2G068330	China
qRT3-33	4	chr4_23192577	23192577	6.39E-06	0.153	GRMZM2G389937	China
qRT3-34	4	chr4_31532503	31532503	2.01E-07	0.2022	GRMZM2G052670	China
qRT3-35	4	chr4_145549902	145549902	1.91E-06	0.1538	AC205672.3_FG001	China
qRT3-36	4	chr4_177073590	177073590	5.09E-06	0.1523	GRMZM2G006297	China
qRT3-37	4	chr4_228578491	228578491	2.91E-06	0.1475	GRMZM2G044848	China
qRT3-38	5	chr5_92429962	92429962	4.56E-06	0.1405	GRMZM2G179454	China
qRT3-39	5	chr5_200376352	200376352	3.72E-10	0.2835	GRMZM2G035213	China
qRT3-40	6	chr6_34160278	34160278	2.28E-06	0.1668	GRMZM2G147804	China
qRT3-41	6	chr6_80802049	80802049	2.50E-06	0.1577	GRMZM2G017421	China
qRT3-42	7	chr7_54479667	54479667	4.30E-06	0.145	GRMZM2G032766	China
qRT3-43	7	chr7_107374028	107374028	5.19E-06	0.1526	No	China
qRT3-44	8	chr8_60106765	60106765	4.34E-06	0.1419	GRMZM2G088291	China
qRT3-45	8	chr8_88681491	88681491	6.38E-06	0.1474	GRMZM2G044531	China
qRT3-46	8	chr8_99084878	99084878	1.66E-06	0.1717	GRMZM2G046824	China
qRT3-47	8	chr8_125477938	125477938	4.08E-06	0.1407	GRMZM5G855411	China
qRT3-48	9	chr9_3901902	3901902	3.89E-06	0.1412	GRMZM2G048243	China
qRT3-49	9	chr9_11330574	11330574	2.70E-06	0.1624	GRMZM2G404855	China
qRT3-50	9	chr9_84233825	84233825	1.36E-06	0.1544	GRMZM2G092256	China
qRT3-51	9	chr9_94815283	94815283	2.59E-06	0.1838	GRMZM5G805627	China
qRT3-52	9	chr9_96620660	96620660	2.30E-06	0.1518	GRMZM2G162623	China
qRT3-53	9	chr9_100954354	100954354	3.76E-06	0.1451	AC226445.2_FG002	China
qRT3-54	9	chr9_103569663	103569663	3.16E-06	0.1466	GRMZM2G010863	China
qRT3-55	9	chr9_138495501	138495501	5.68E-06	0.1592	GRMZM2G145451	China
qRT3-56	10	chr10_47855681	47855681	5.27E-08	0.2002	GRMZM2G570790	China

TT3	<i>qTT3-1</i>	7	chr7 15499854	15499854	2.68E-06	0.1486	GRMZM2G179090	China	
ATLOG	<i>qATLOG-1</i>	4	rs131181045	36451477	[-log ₁₀ =4.5]	10.14	*	Portugal	(Alves et al., 2020)
	<i>qATLOG-2</i>	4	rs129686170	44985143	[-log ₁₀ =4.2]	10.00	*	Portugal	
	<i>qATLOG-3</i>	4	rs129686172	44985307	[-log ₁₀ =4.2]	10.00	*	Portugal	
	<i>qATLOG-4</i>	4	rs129686173	44985374	[-log ₁₀ =4.2]	10.00	*	Portugal	
	<i>qATLOG-5</i>	4	rs129686175	44985417	[-log ₁₀ =4.2]	10.00	*	Portugal	
	<i>qATLOG-6</i>	4	rs129686679	45151080	[-log ₁₀ =4.2]	10.00	*	Portugal	
	<i>qATLOG-7</i>	4	rs131452300	45215363	[-log ₁₀ =4.2]	10.00	*	Portugal	
	<i>qATLOG-8</i>	4	rs129686902	45289528	[-log ₁₀ =4.2]	10.00	*	Portugal	
	<i>qATLOG-9</i>	4	rs131452316	45289828	[-log ₁₀ =4.2]	10.00	*	Portugal	
	<i>qATLOG-10</i>	5	rs130180529	200420347	[-log ₁₀ =5.6]	13.31	*	Portugal	
	<i>qATLOG-11</i>	5	rs130180536	200421939	[-log ₁₀ =5.6]	13.31	*	Portugal	
	<i>qATLOG-12</i>	5	rs130200955_1	212731495	[-log ₁₀ =4.6]	10.20	*	Portugal	
	<i>qATLOG-13</i>	5	rs130200955_2	212731495	[-log ₁₀ =4.6]	10.20	*	Portugal	
	<i>qATLOG-14</i>	10	rs128647552	149506640	[-log ₁₀ =4.3]	9.58	*	Portugal	
DTLOG	<i>qDTLOG-1</i>	1	rs128990610	298814922	[-log ₁₀ =5.9]	19.67	*	Portugal	
	<i>qDTLOG-2</i>	1	rs128990610	298814922	[-log ₁₀ =4.6]	13.37	*	Portugal	
	<i>qDTLOG-3</i>	1	rs128990613	298815104	[-log ₁₀ =5.9]	19.67	*	Portugal	
	<i>qDTLOG-4</i>	1	rs128990613	298815104	[-log ₁₀ =4.6]	13.37	*	Portugal	
	<i>qDTLOG-5</i>	2	rs131335950	41312594	[-log ₁₀ =4.4]	12.81	*	Portugal	
	<i>qDTLOG-6</i>	2	rs129211723	204555793	[-log ₁₀ =4.1]	12.14	*	Portugal	
	<i>qDTLOG-7</i>	3	rs131178368	17449753	[-log ₁₀ =5.7]	13.75	*	Portugal	
	<i>qDTLOG-8</i>	3	rs131178368	17449753	[-log ₁₀ =4.1]	12.21	*	Portugal	
	<i>qDTLOG-9</i>	3	rs129286980	170499908	[-log ₁₀ =5.4]	12.60	*	Portugal	
	<i>qDTLOG-10</i>	3	rs129286980	170499908	[-log ₁₀ =4.6]	12.87	*	Portugal	
	<i>qDTLOG-11</i>	4	rs129619500	2985173	[-log ₁₀ =4.0]	13.48	*	Portugal	
	<i>qDTLOG-12</i>	4	rs131462576	71242320	[-log ₁₀ =4.0]	10.26	*	Portugal	
	<i>qDTLOG-13</i>	5	rs131510695	33437545	[-log ₁₀ =4.0]	11.98	*	Portugal	
	<i>qDTLOG-14</i>	6	rs131553173	22002210	[-log ₁₀ =4.2]	11.44	*	Portugal	
	<i>qDTLOG-15</i>	6	rs131568062	59267250	[-log ₁₀ =4.6]	14.10	*	Portugal	
	<i>qDTLOG-16</i>	6	rs131568326	60040082	[-log ₁₀ =5.2]	16.20	*	Portugal	
	<i>qDTLOG-17</i>	6	rs131568350	60174784	[-log ₁₀ =5.3]	18.31	*	Portugal	
	<i>qDTLOG-18</i>	7	rs131179571	135606083	[-log ₁₀ =4.2]	15.45	*	Portugal	
	<i>qDTLOG-19</i>	7	rs131181519	157314622	[-log ₁₀ =4.1]	13.09	*	Portugal	
GT	<i>qGT-1</i>	1	rs131269931	82014738	[-log ₁₀ =4.3]	9.50	*	Portugal	
	<i>qGT-2</i>	1	rs128653362	82031110	[-log ₁₀ =4.0]	8.54	*	Portugal	
	<i>qGT-3</i>	1	rs131280450	101025418	[-log ₁₀ =4.1]	7.22	*	Portugal	
	<i>qGT-4</i>	4	rs129940387	225448671	[-log ₁₀ =4.2]	7.80	*	Portugal	
	<i>qGT-5</i>	8	rs131179677	26077645	[-log ₁₀ =4.8]	9.27	*	Portugal	
δT	<i>qδT</i>	1	Zm00001d028680	2,788,600-42,791,622	2.625E-06	*	Ankyrin repeat-containing protein	Aurora, NY	Hershberger et al. (2022)
γT	<i>qγT</i>	1	Zm00001d028680	42,788,600-42,791,622	5.774E-06	*	Ankyrin repeat-containing protein	Aurora, NY	
ΣT	<i>qΣT</i>	1	Zm00001d028680	42,788,600-42,791,622	1.968E-05	*	Ankyrin repeat-containing protein	Aurora, NY	
γT	<i>qγT</i>	1	Zm00001d034433	292,905,093-292,912,832	1.804E-05	*	Heat stress transcription factor 11	Aurora, NY	
ΣT	<i>qΣT</i>	1	Zm00001d034433	292,905,093-292,912,832	2.045E-05	*	Heat stress transcription factor 11	Aurora, NY	
ΣT	<i>qΣT</i>	2	Zm00001d007121	222,781,921-222,806,658	2.388E-07	*	CW-type Zinc Finger	Aurora, NY	
γT	<i>qγT</i>	2	Zm00001d007121	222,781,921-222,806,658	7.702E-07	*	CW-type Zinc Finger	Aurora, NY	

$\Sigma T3$	$q\Sigma T3$	2	Zm00001d007489	232,843,576-232,847,278	8.183E-07	*	Zinc-finger domain of monoamine-oxidase A repressor R1	Aurora, NY
ΣT	$q\Sigma T$	3	Zm00001d040089	27,065,943-27,068,338	1.975E-05	*	Nodulin MtN21 /EamA-like transporter family protein	Aurora, NY
$\Sigma T3$	$q\Sigma T3$	3	Zm00001d042231	156,958,516-156,959,137	2.572E-06	*	Basal endosperm transfer layer10	Aurora, NY
$\Sigma T3$	$q\Sigma T3$	3	Zm00001d043479	201,465,990-201,469,783	6.036E-06	*	Coiled-coil domain-containing protein 25	Aurora, NY
αT	$q\alpha T$	4	Zm00001d049809	45,664,408-45,668,447	3.294E-06	*	*	Aurora, NY
γT	$q\gamma T$	4	Zm00001d053899	243,343,911-243,347,704	1.066E-05	*	Rho-related protein from plants2	Aurora, NY
$\alpha T/\gamma T$	$q(\alpha T/\gamma T)$	5	Zm00001d017746	205,825,586-205,829,216	1.133E-15	*	Vitamin E synthesis4	Aurora, NY
$\gamma T/(\gamma T+\alpha T)$	$q\gamma T/(\gamma T+\alpha T)$	5	Zm00001d017746	205,825,586-205,829,216	3.105E-15	*	Vitamin E synthesis4	Aurora, NY
αT	$q\alpha T$	5	Zm00001d017746	205,825,586-205,829,216	3.100E-11	*	Vitamin E synthesis4	Aurora, NY
$\delta T/\alpha T$	$q(\delta T/\alpha T)$	5	Zm00001d017746	205,825,586-205,829,216	3.030E-08	*	Vitamin E synthesis4	Aurora, NY
γT	$q\gamma T$	5	Zm00001d017746	205,825,586-205,829,216	3.847E-08	*	Vitamin E synthesis4	Aurora, NY
γT	$q\gamma T$	5	Zm00001d018086	213,976,676-213,977,392	1.329E-05	*	*	Aurora, NY
ΣT	$q\Sigma T$	6	Zm00001d036727	99,181,767-99,186,018	2.166E-05	*	Alpha/beta-Hydrolases superfamily protein	Aurora, NY
ΣT	$q\Sigma T$	6	Zm00001d038608	160,896,290-160,898,350	9.560E-06	*	Class VI heat shock protein	Aurora, NY
$\Sigma T3+\Sigma T$	$q(\Sigma T3+\Sigma T)$	6	Zm00001d039066	169,497,057-169,501,065	4.789E-07	*	Galactose mutarotase-like superfamily protein	Aurora, NY
ΣT	$q\Sigma T$	4	Zm00001d011365	148,696,781-148,699,784	1.03E-05	*	Alpha/beta-Hydrolases superfamily protein	Aurora, NY
ΣT	$q\Sigma T$	5	Zm00001d011825	162,158,586-162,160,692	1.71E-05	*	Probable gamma-secretase subunit PEN-2	Aurora, NY
ΣT	$q\Sigma T$	2	Zm00001d011923	164,678,915-164,684,859	3.01E-06	*	TNF receptor-associated factor 26	Aurora, NY
γT	$q\gamma T$	4	Zm00001d011923	164,678,915-164,684,859	1.01E-05	*	TNF receptor-associated factor 26	Aurora, NY

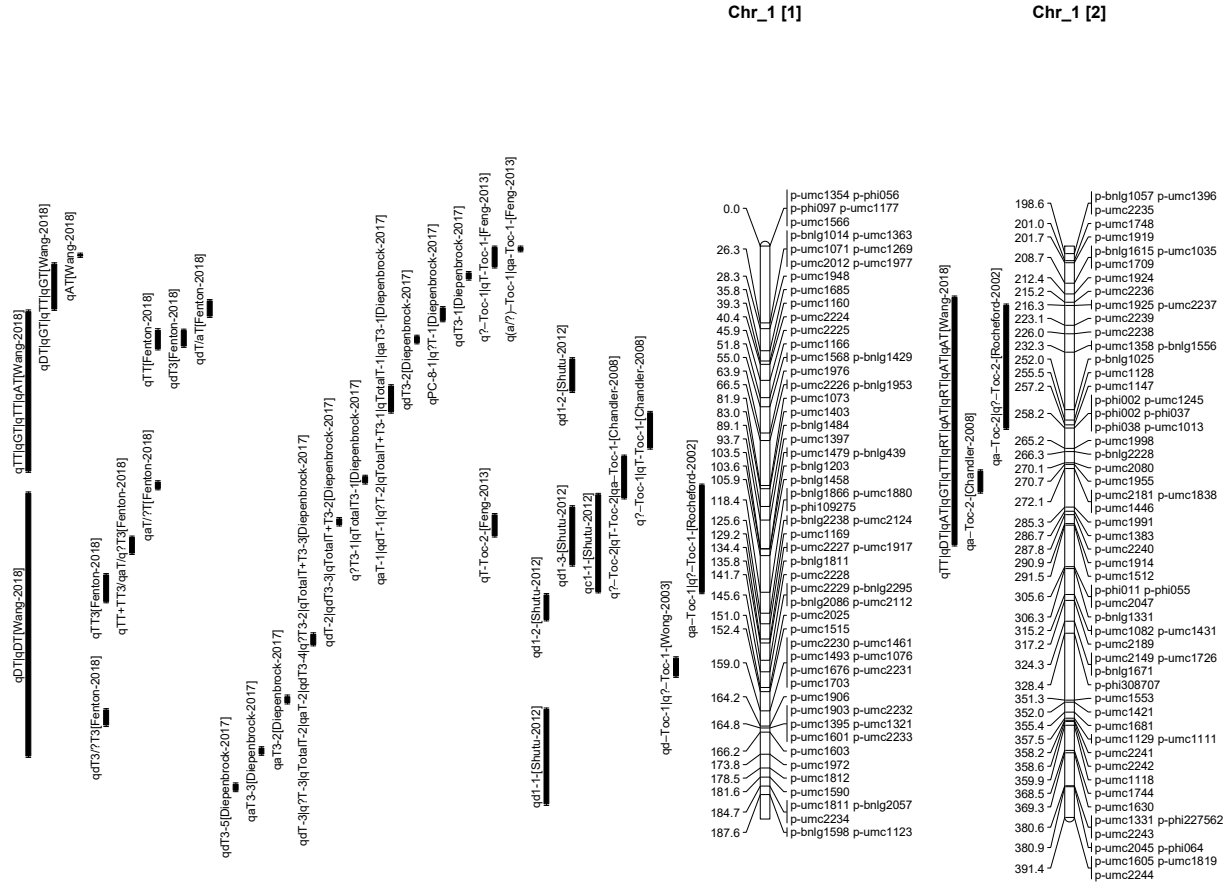


Figure S1. Chromosome locations of QTL that control seed α -tocopherol (α -Toc), γ -tocopherol (γ -Toc), δ -tocopherol (δ -Toc), total tocopherol (T-Toc) contents and (α/γ)-Toc ratio in maize from 2002 to 2022.

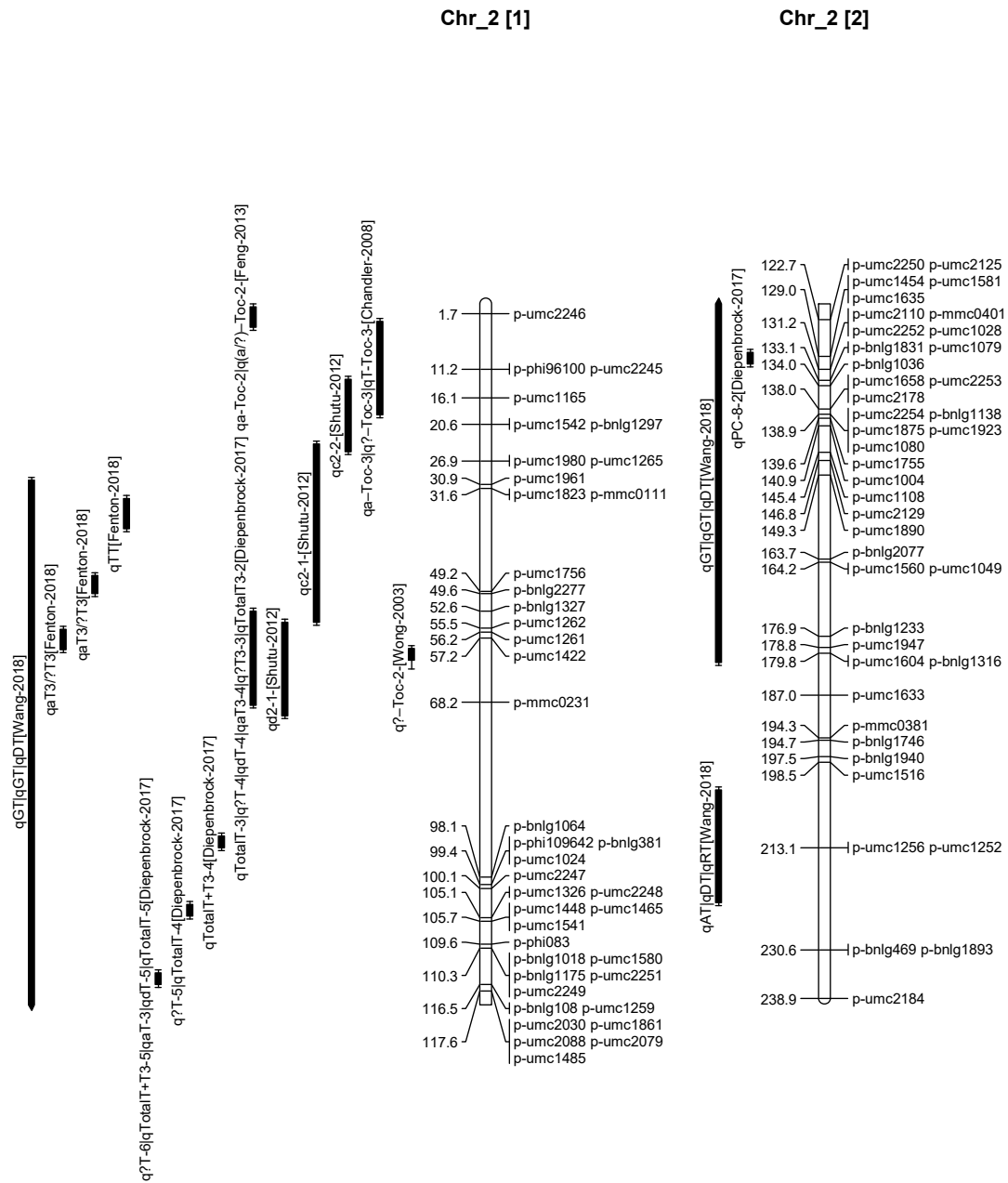
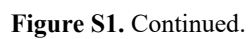
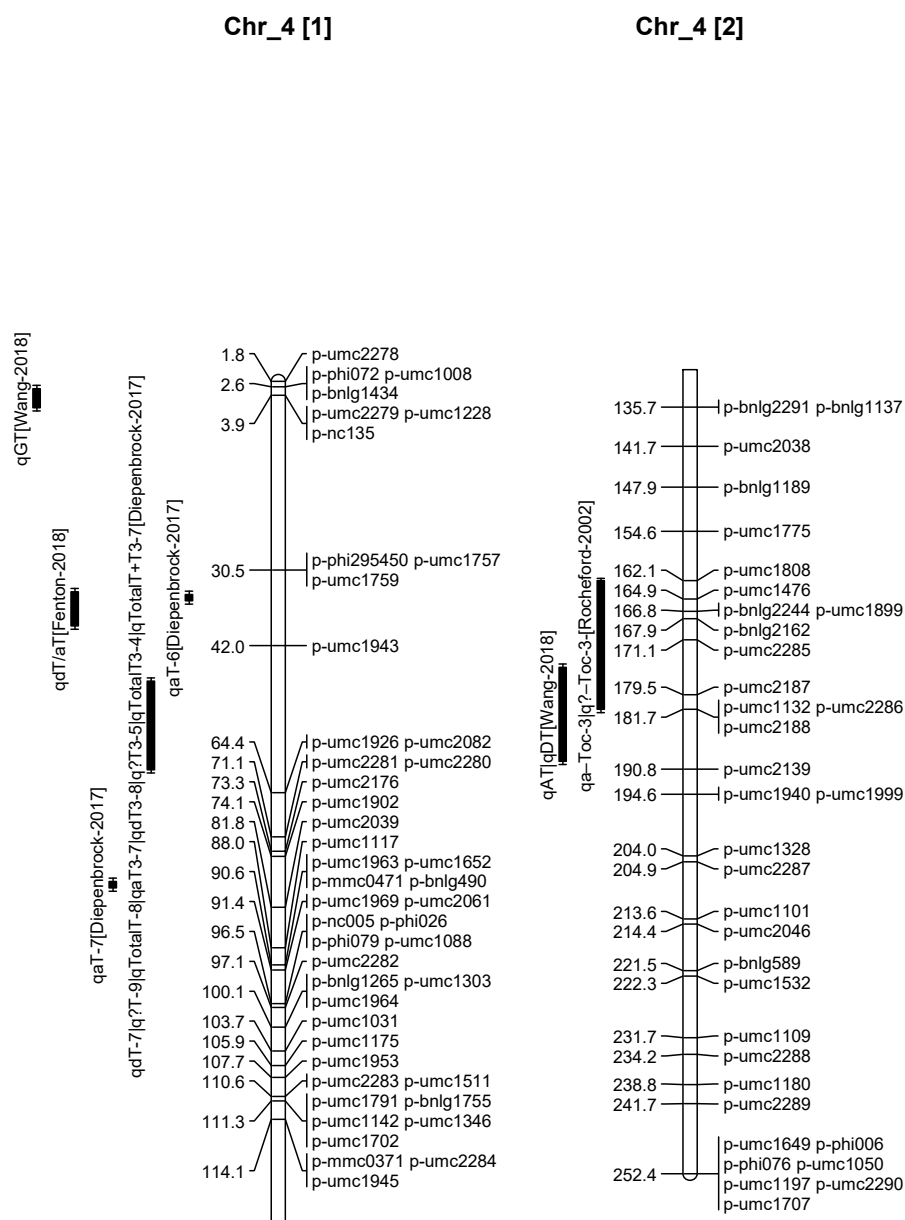


Figure S1. Continued.





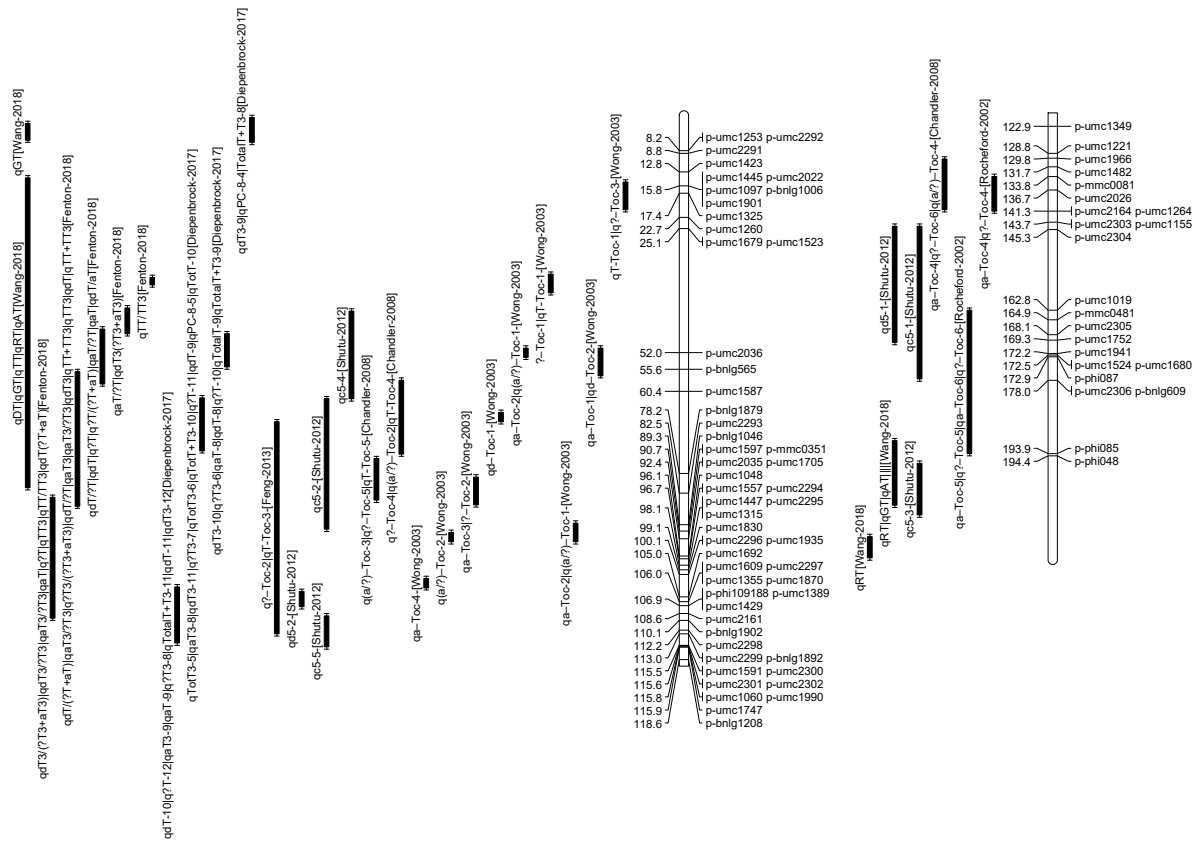


Figure S1. Continued.

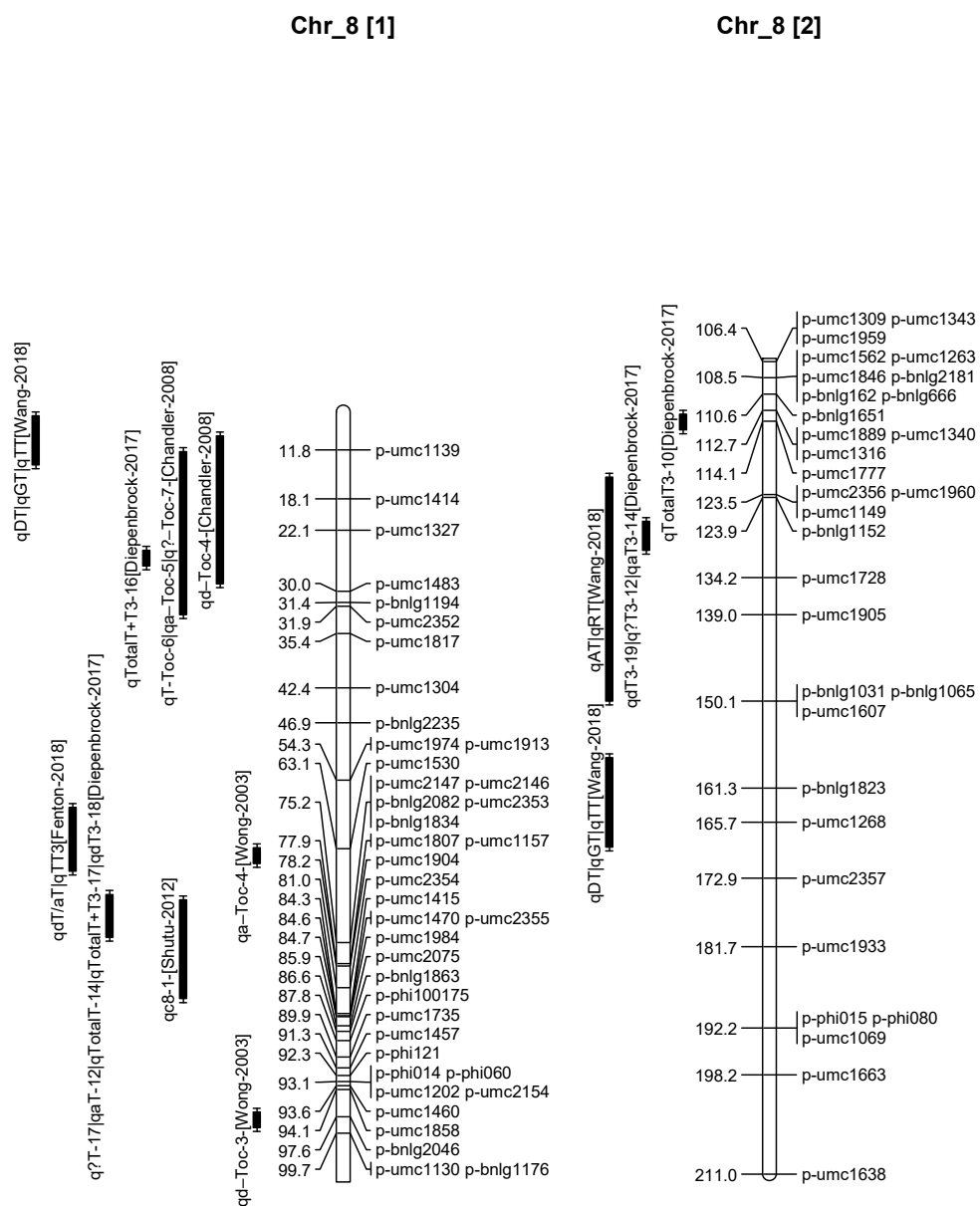


Figure S1. Continued.

Chr_9

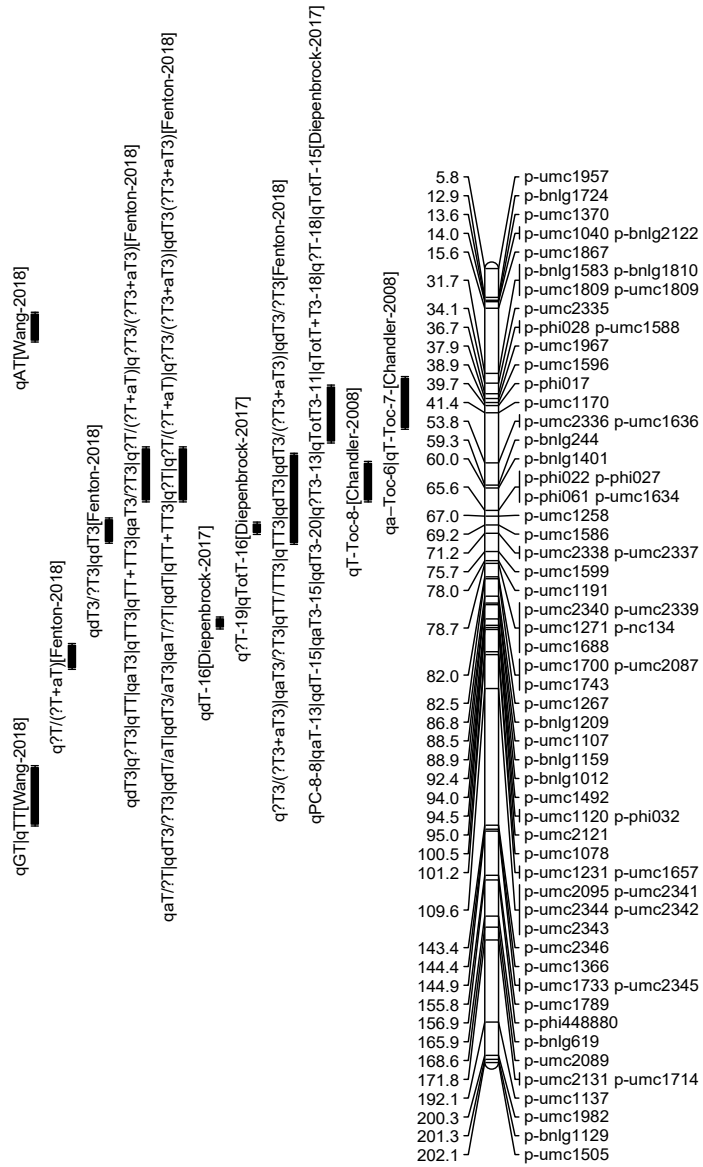


Figure S1. Continued.

Chr_10

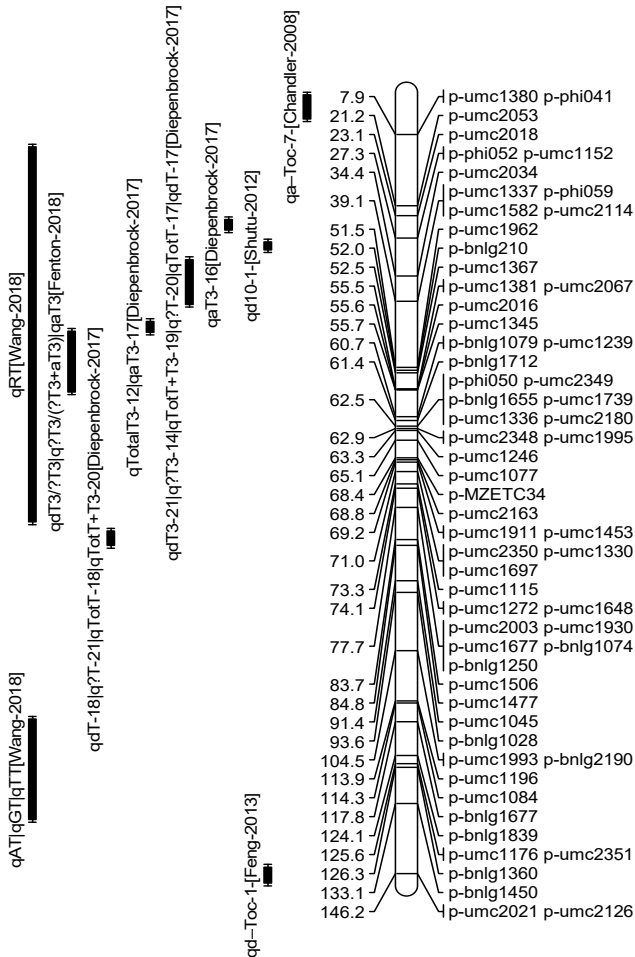


Figure S1. Continued.